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ABSTRACT

This document contains teacher and student materials for a course in graphic arts concentrating on printing presses and the finishing process for publications. Seven units of instruction cover the following topics: (1) offset press systems; (2) offset inks and dampening chemistry; (3) offset press operating procedures; (4) preventive maintenance and troubleshooting; (5) job ticket and cost awareness; (6) calculating paper cutting; and (7) binding and finishing. The teacher edition contains some or all of the following components of a unit of study: suggested activities, instructor supplements, assignment sheet answers, written test, written test answers, unit evaluation form, and transparency masters. The teacher edition also includes introductory pages that contain, in addition to the general information such as the table of contents, foreword, and acknowledgments, an explanation of the use of the publication, a competency profile, an instructional task analysis, a list of related academic and workplace skills, a tools, equipment and materials list, and a list of 26 references. Each unit in the student edition contains some or all of the following components: objective sheet, information sheet, student supplements, assignment sheets, and job sheets. (KC)

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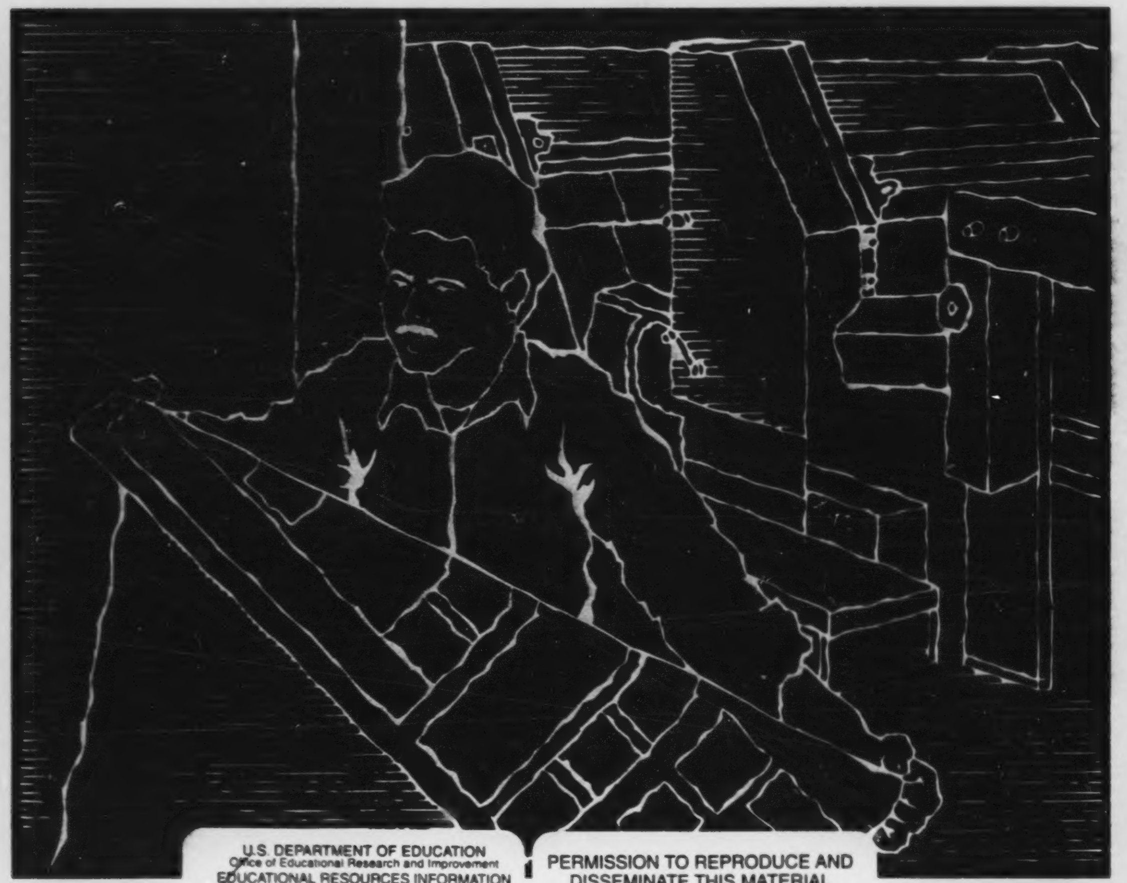
ED 410 417

GRAPHIC ARTS

THE PRESS AND FINISHING PROCESSES



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TEACHER EDITION

BEST COPY AVAILABLE

MAVCC

Graphic Arts

The Press and Finishing Processes

Third Edition

Teacher Edition

Revised by

Dan Crummett

Project Coordinated by

Jane Huston

Developed by

The Multistate Academic and Vocational Curriculum Consortium, Inc.

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Graphic Arts
The Press and Finishing Processes
Third Edition

Teacher Edition

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Teacher Page

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Foreword

Graphic Arts: The Press and Finishing Processes is the third in a series of instructional materials on graphic communication developed by the Multistate Academic and Vocational Curriculum Consortium (MAVCC). This publication addresses the new technologies that are changing the printing industry and introduces basic concepts and skills necessary for a student to be employed in an entry-level graphic communication occupation. Additional instructional materials have been developed for *Graphic Arts: Orientation, Composition, and Paste-Up; Graphic Arts: Process Camera, Stripping, and Platemaking; and Basics of Desktop Publishing.*

Teachers are encouraged to read the suggested activities section for each unit of instruction and to make arrangements for those activities they plan to include as part of their instruction. These materials are designed so that teachers may localize/personalize/supplement the units to fit class interests, individual learning styles, and various instructional methods, and to incorporate new and emerging technologies and processes.

Special attention should be given to the matrix identifying basic academic and workplace skills being reinforced in these instructional materials. A chart which classifies and defines each of the academic and workplace skills and competencies has been included in the teacher edition and reflects key elements from *What Work Requires of Schools: A SCANS Report for America 2000*, a 1991 study by the U.S. Department of Labor; *Workplace Basics: The Skills Employers Want*, a three-year study conducted jointly by the American Society for Training and Development (ASTD) and the United States Department of Labor (DOL); and other national and state sources. These tools have been provided in an effort to help educators identify and document where basic academic and workplace skills are being taught. By reinforcing these skills, the teacher should assist students in improving their employability skills.

As you use these instructional materials, we hope that you will find that they contribute to the quality of your program. If any problems occur or if you have any suggestions for improvement of the materials, please call or write us.

Jean McEntire, Chair
Board of Directors
Multistate Academic and
Vocational Curriculum Consortium

Clark R. Harris
Executive Director
Multistate Academic and
Vocational Curriculum Consortium

Acknowledgements

Appreciation is extended to those individuals who contributed their time and talent to the revision of *Graphic Arts: The Press and Finishing Processes.*

Well-deserved thanks go to the many industry and education representatives who participated as members of MAVCC's graphic arts committees throughout the years. Their assistance in developing and reviewing these instructional materials has been an essential step in MAVCC's development process. Thanks are also extended to the following companies who provided reference materials and artwork for this publication: A.B. Dick, Chicago, Illinois; AM Multigraphics, Mt. Prospect, Illinois; The Challenge Machinery Company, Grand Haven, Michigan; Graphic Arts Technical Foundation, Pittsburgh, Pennsylvania; Heidelberg Offset, Heidelberg, West Germany; 3M Company, St. Paul, Minnesota.

Special recognition is given to the authors of the original publication—Karim Farajollahi, Gary Ogle, William Reed, and Kenneth Woodcock, and to Robert Thomas and Glen Witteman of Braudenick Printery, to Bob Ford of the Journal Record Publishing Company, and to Bud Roland of North Star Ink for their assistance in revising the first edition.

Thanks are also extended to Debra Gregor and Danny Hoggatt, graphic communication instructors, Central Tech, Drumright, Oklahoma; Larry Smith, of the "Copy Shop" at Frontier Printers; and to Diane Kessler and Randy Seales, employees of the Graphics Division of the Oklahoma Department of Vocational and Technical Education, for their assistance and support in revising the graphic arts series.

Special appreciation is extended to Jerrie Crummett for her assistance in electronic publishing, and to the employees of the Graphics Division of the Oklahoma Department of Vocational and Technical Education for printing this publication.

A final thank you to Jane Huston for coordinating this project.

Use of Introductory Materials

Introductory materials are included in the teacher edition only and contain useful information to assist administrators and teachers in planning for instruction.

In addition to the general information such as the table of contents, foreword, and acknowledgements, information is included on the following:

1. **Use of this publication**—Explains the components of a unit of instruction and how they should be used as part of the teaching/learning process.
2. **Competency profile**—Provides a record of student performance for each task included in a unit of instruction. This becomes a part of the student's permanent records and should be utilized when directing the student toward employment opportunities.
3. **Instructional/task analysis**—Provides a quick review of contents of the publication; identifies cognitive (knowledge) skills and psychomotor (doing) skills addressed in each unit of instruction.
4. **Related academic and workplace skills list**—Classifies unit tasks (assignment sheets and job sheets) according to related academic and workplace skills and competencies being reinforced. Skill areas reflected by skill groups, sub skills, and definitions have been identified using *What Work Requires of Schools: A SCANS Report for America 2000* and *Workplace Basics: The Skills Employers Want.*
5. **Tools, equipment, and materials list**—Provides a comprehensive list of those items needed to successfully complete the assignment sheets and/or job sheets; assists administrator/teacher in determining program costs.
6. **Reference list**—Provides a comprehensive list of resources used in the development of this publication.

As you use these materials, it is hoped that they will provide useful information to meet a variety of needs.

Use of This Publication

Graphic Arts: The Press and Finishing Processes contains seven units of instruction. For the teacher edition, the pages are divided into teacher pages and student pages. These include the following:

Teacher Pages

Suggested Activities
Answers to Assignment Sheets*
Written Test
Answers to Written Test
Unit Evaluation Form
Transparency Masters*

Student Pages

Objective Sheet
Information Sheet
Student Supplements*
Assignment Sheets*
Job Sheets*

* *Designates components that may not appear in every unit of instruction*

The complete teacher edition consists of both teacher pages and student pages, as well as the introductory pages. Student pages focus on measurable and observable learning outcomes. Teacher pages provide evaluation tools and suggestions on ways to supplement, localize, personalize, and motivate in order to present a complete teaching/learning process.

MAVCC instructional materials are competency-based, not time-based. Students should be allowed to work until they master each competency.

Units of instruction are designed for use in more than one lesson or class period. Careful study of each unit of instruction by the teacher will help to determine the following:

- Amount of materials that can be covered in each class period
- Skills that must be demonstrated
- Amount of class time needed for teacher demonstrations
- Amount of time needed for student practice
- Supplementary materials, including print and nonprint media and equipment and supplies, that must be ordered.
- Resource people who must be contacted

Teacher Pages

Suggested Activities

This component is included only in the teacher edition. The suggested activities assist teachers during the preparation stage of the teaching/learning process by providing teaching suggestions and a list of supplemental resources. The teacher should read the suggested activities before teaching the units and decide how each objective can best be taught. Time should also be allowed to obtain supplemental materials, prepare audiovisual materials, and contact outside resources. Duties of the teacher will vary according to the particular unit.

To assist a teacher in obtaining suitable supplemental materials, references used in the development of each unit are listed in this component, along with suggested supplemental resources such as books, posters, pamphlets, videotapes, and computer software.

Assignment and Written Test Answers

These are designed to assist the teacher in evaluation of student performances.

Written Test

This component provides criterion-referenced evaluation of every cognitive objective listed in the unit of instruction. The written test may be duplicated for student use. If objectives have been added, deleted, or modified, appropriate changes should be made on the written test. It is recommended that the tests be divided into shorter tests covering three or four objectives at a time and given soon after those objectives have been covered. A selection of test items from the units covered may be used for final tests at the end of each term if desired.

Unit Evaluation Form

This sheet provides teachers with a record of each student's performance on a unit of instruction. It includes space for assignment sheet ratings, job sheet ratings, written test scores, and teacher comments. The unit evaluation form may be duplicated.

Transparency Masters

Transparency masters are used to direct the students' attention to the topic of classroom discussion. They may provide illustrations, charts, schematics, or additional information needed to clarify and reinforce objectives included in the unit of instruction.

Student Pages

Objective Sheet

Each unit of instruction is based on performance objectives which state the goals for successful completion of the course. These performance objectives are stated in two forms: unit objectives which state the expected performance of each student after completion of the unit of instruction, and specific objectives which state what the student must do to reach the unit objective.

The objectives should be stressed throughout the teaching/learning process. This will help answer any questions concerning performance requirements for each instructional unit. The objectives can also help determine teaching strategies and instructional methods. Teachers should prepare for each unit by deciding how each objective can best be taught.

Teachers should feel free to modify, delete, or add objectives in order to meet the needs of the students and community. When objectives are added, the teacher should remember to supply the needed information, assignment and/or job sheets, and written test items.

Information Sheet

The information sheet provides the content essential for meeting the cognitive (knowledge) objectives of the unit. Teachers will find that the information sheet serves as an excellent guide for presenting background knowledge necessary to develop the skills specified in the unit objective. Students should read the information sheet before the information is discussed in class. Space is provided in margins for students and teachers to add notes that supplement, localize, personalize, or provide information for the teaching of each objective.

Student Supplements

The information presented in a student supplement may consist of tables, charts, written information, forms, or other information students will need in order to complete one or more of the assignment and/or job sheets. Students are not directly tested over the information presented in a supplement; however, their ability to apply this information may be evaluated in the completion of assignment sheets and/or job sheets.

Assignment Sheets

Assignment sheets provide students with pencil and paper activities that give students the opportunity to make practical application of the knowledge in the information sheet.

Job Sheets

Job sheets are an important segment of each unit. Job sheets provide potential employers with a picture of the skills being taught during training and the performances that might reasonably be expected from an individual who has had this training.

The job sheets provide criteria to objectively evaluate student performance, a list of required equipment and materials, and a step-by-step procedure for performing a psychomotor skill. The teacher should discuss the equipment and materials available in the classroom, laboratory, or shop and demonstrate the procedure prior to having students practice the procedure. When a student is ready to be evaluated, the teacher should follow instructions for evaluating student performance shown below.

Instructions For Evaluating Student Performance

When the student is ready to perform a specific task, obtain a copy of the job sheet which may be found in either the teacher or student edition. Then observe the student performing the procedure.

Process evaluation—Place a mark in the box to the left of each designated checkpoint if the student has satisfactorily achieved the step(s) for each checkpoint area. If the student is unable to correctly complete the procedure, have the student review the materials and try again.

Product evaluation—Once the student has satisfactorily completed the procedure, rate the student product (outcome) using the criteria which have been provided as part of the job sheet. If the student's product is unacceptable, have the student review the materials and submit another product for evaluation.

Sample performance evaluation keys have been provided below. Many other keys are available. Select one rating (grading scale) which best fits your program needs.

Option A

4 - Skilled—Can perform job with no additional training.
3 - Moderately skilled—Has performed job during training program; limited additional training may be required.
2 - Limited skill—Has performed job during training program; additional training is required to develop skill.
1 - Unskilled—Is familiar with process, but is unable to perform job.

Option B

Yes—Can perform job with no additional training.

No—Is unable to perform job satisfactorily.

Graphic Arts
The Press and Finishing Processes

Competency Profile

Name: ______________________________

Directions: Evaluate the student using the rating scale below. Write the appropriate number to indicate the degree of competency achieved. The descriptions associated with each of the numbers focus on a level of student performance for each of the tasks listed. The written test scoreline is provided for optional teacher use. It may not be applicable in all cases.

Option A

Rating scale:
4 – Skilled – Can perform job with no additional training.
3 – Moderately Skilled – Has performed job during training program; limited additional training may be required.
2 – Limited Skill – Has performed job during training program; additional training is required to develop skill.
1 – Unskilled – Is familiar with process, but is unable to perform job.
0 – No Exposure – No information or practice provided during training program, complete training required.
NA – Non-applicable.

Option B

Yes – Can perform with no additional training
No – Is unable to perform satisfactorily

Unit I: Offset Press Systems

_______ 1. Test the basic theory of offset printing.
_______ 2. ______________________________
_______ 3. ______________________________

_______ Written Test Score

Unit II: Offset Inks and Dampening Chemistry

_______ 1. Conduct an ink cabinet inventory.
_______ 2. Conduct an inventory of offset press dampening chemistry.
_______ 3. Mix dampening solution and test for pH.
_______ 4. Mix PMS colors and conduct and evaluate an ink draw-down or smear.
_______ 5. Mix two colors of ink to produce a third color.
_______ 6. ______________________________
_______ 7. ______________________________

_______ Written Test Score

Unit III: Offset Press Operating Procedures

_______ 1. Compare control features of offset presses.
_______ 2. Set up the sheet control systems.
_______ 3. Set up the image control systems.
_______ 4. Operate an offset press from setup of systems through printed sheet delivery.
_______ 5. Perform a color wash on an offset press.
_______ 6. Print envelopes.
_______ 7. Change press from envelopes to letterhead.
_______ 8. Print a two-color job.

_______ 9. Print a work-and-turn.
_______ 10. Print halftones and screen tints.
_______ 11. Print solids.
_______ 12. Perform perforation and scoring.
_______ 13. ______________________________
_______ 14. ______________________________

_______ Written Test Score

Unit IV: Preventive Maintenance and Troubleshooting

_______ 1. Use a troubleshooting guide to find the best solution to an ink and dampening problem.
_______ 2. Use a troubleshooting guide to find the best solution to a paper stock problem.
_______ 3. Use a troubleshooting guide to find the best solution to a process problem.
_______ 4. Use a troubleshooting guide to find the best solution to a mechanical problem.
_______ 5. Determine lubrication requirements for a specific press.
_______ 6. Set up a preventive maintenance schedule in chart form.
_______ 7. Take an inventory of spare parts.
_______ 8. Adjust dampener rollers to plate cylinder.
_______ 9. Adjust ink form rollers to plate cylinder.
_______ 10. Adjust plate cylinder to blanket cylinder.
_______ 11. Adjust blanket cylinder to impression cylinder.
_______ 12. Change a molleton cover.
_______ 13. Degrease plate and impression cylinders.
_______ 14. Deglaze ink rollers and blanket.
_______ 15. Change blanket.
_______ 16. Backflush vacuum pump.
_______ 17. ______________________________
_______ 18. ______________________________

_______ Written Test Score

Unit V: Job Ticket and Cost Awareness

_______ 1. Estimate costs of printing jobs.
_______ 2. ______________________________
_______ 3. ______________________________

_______ Written Test Score

Unit VI: Calculating Paper Cutting

_______ 1. Use the formula for cutting paper stock.
_______ 2. Use the formula to determine how many sheets will be required.
_______ 3. Calculate a combination cut using stock cutting formula.
_______ 4. Draw a cutting diagram.
_______ 5. Cut carbonless paper.
_______ 6. ______________________________
_______ 7. ______________________________

_______ Written Test Score

Unit VII: Binding and Finishing

_______ 1. Pad 20-pound stock.
_______ 2. Pad carbonless paper.
_______ 3. Drill paper stock for a 3-ring binder.
_______ 4. Fold paper using a folding machine.
_______ 5. Hand fold, collate, and staple a booklet.
_______ 6. Score a job.
_______ 7. ____________________
_______ 8. ____________________

_______ Written Test Score

COMMENTS:

____

____

____

____

Evaluator: ____________________ Date: ____________________

* Permission to duplicate this profile is granted.

Graphic Arts
The Press and Finishing Processes

Instructional/Task Analysis

Related Information: What the Student Should Know	Application: What the Student Should Be Able to Do
Unit I: Offset Press Systems	
1. Terms and definitions	
2. Basic theory of offset printing	
3. Basic systems of a typical sheet fed offset press	
4. Functions of systems of a typical sheet fed offset press	
5. Components of the feeder system of a typical offset press	
6. Functions of the feeder system	
7. Types of feeder systems used on offset presses	
8. Components of the register system of a typical offset press	
9. Functions of components of the register system	
10. Types of register systems used on sheet fed offset presses	
11. Components of the cylinder system in a typical offset press	
12. Functions of components of the cylinder system	
13. Offset press cylinder arrangements	
14. Components of the inking system of a typical offset press	
15. Components of the dampening system of a typical offset press	
16. Components of the inking/dampening system and their functions	
17. Types of dampening systems	

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit I: Offset Press Systems (cont.)

18. Components of the delivery system of a typical offset press
19. Functions of components of the delivery system
20. Types of delivery systems

21. Test the basic theory of offset printing

Unit II: Offset Inks and Dampening Chemistry

1. Terms and definitions
2. Main ingredients of offset inks
3. Three ink manufacturing procedures which benefit the user
4. Types of ink
5. Conditions influencing the performance of offset inks
6. Ink properties which affect the printing quality of offset inks
7. Rules for ink care and storage
8. Purpose of offset dampening solutions
9. Dampening solution ingredients and their functions
10. Methods of measuring pH
11. Acceptable range of pH for a fountain solution
12. Effects of using alcohol or alcohol substitutes in a fountain solution
13. Importance of ink-water balance

14. Conduct an ink cabinet inventory
15. Conduct an inventory of offset press dampening chemistry
16. Mix dampening solution and test for pH
17. Mix PMS colors and conduct and evaluate an ink draw-down or smear
18. Mix two colors of ink to produce a third color

Unit III: Offset Press Operating Procedures

1. Terms and definitions
2. Essential safety precautions
3. Reasons why efficient press operation is important
4. Offset press operator control functions
5. Typical operator control features

Instructional/Task Analysis

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit III: Offset Press Operating Procedures (cont.)

6. Steps in the sequence of paper movement through a typical offset press
7. Control features of offset presses

8. Set up the sheet control systems
9. Set up the image control systems
10. Operate an offset press from setup of systems through printed sheet delivery
11. Perform a color wash on an offset press
12. Print envelopes
13. Change press from envelopes to letterhead
14. Print a two-color job
15. Print a work-and-turn
16. Print halftones and screen tints
17. Print solids
18. Perform perforation and scoring

Unit IV: Preventive Maintenance and Troubleshooting

1. Terms and definitions
2. Advantages of a routine, thorough preventive maintenance program
3. Areas of work in a preventive maintenance program
4. Preventive maintenance schedules
5. Requirements for a preventive maintenance schedule
6. Preventive maintenance procedures for daily cleanup
7. Preventive maintenance procedures for weekly cleanup
8. Preventive maintenance procedures for monthly cleanup
9. Procedures for daily, weekly, and monthly lubrication

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit IV: Preventive Maintenance and Troubleshooting (cont.)

10. Daily and weekly adjustment procedures
11. Monthly adjustment requirements
12. Steps in making an ink form roller check
13. Ink stripe configurations
14. Troubleshooting techniques
15. Categories of press troubles
16. Types of emulsification
17. Technique for avoiding emulsification
18. Conditions that create ink drying problems
19. Common ink troubles on the press
20. Guidelines for evaluating good print quality
21. Print quality problems

22. Use a troubleshooting guide to find the best solution to an ink and dampening problem
23. Use a troubleshooting guide to find the best solution to a paper stock problem
24. Use a troubleshooting guide to find the best solution to a process problem
25. Use a troubleshooting guide to find the best solution to a mechanical problem
26. Determine lubrication requirements for a specific press
27. Set up a preventive maintenance schedule in chart form
28. Take an inventory of spare parts
29. Adjust dampener rollers to plate cylinder
30. Adjust ink form rollers to plate cylinder
31. Adjust plate cylinder to blanket cylinder
32. Adjust blanket cylinder to impression cylinder
33. Change a molleton cover
34. Degrease plate and impression cylinders
35. Deglaze ink rollers and blanket
36. Change blanket
37. Backflush vacuum pump

Unit V: Job Ticket and Cost Awareness

1. Terms and definitions
2. Fixed and variable costs of a printing job
3. Cost items to consider when giving an estimate of a printing job
4. Cost awareness factors for a successful printing business

Instructional/Task Analysis

Related Information: What the Student Should Know

Application: What the Student Should Be Able to Do

Unit V: Job Ticket and Cost Awareness (cont.)

5. Proper practices for waste management in the printing shop
6. Definition of a job ticket
7. Components of a job ticket
8. Printing trade customs
9. Estimate costs of printing jobs

Unit VI: Calculating Paper Cutting

1. Terms and definitions
2. Safety rules for operating a paper cutter
3. Purpose of jogging paper before cutting
4. Types of paper cutters
5. Techniques for cutting carbonless paper
6. Formula for cutting paper stock
7. Formula for determining the number of sheets to be cut for a printing job
8. Formulas for making a combination cut
9. Use the formula for cutting paper stock
10. Use the formula to determine how many sheets will be required
11. Calculate a combination cut using stock cutting formula
12. Draw a cutting diagram
13. Cut carbonless paper

Unit VII: Binding and Finishing

1. Terms and definitions
2. Binding techniques
3. Major folding styles
4. Processes associated with finishing activities
5. Pad 20-pound stock
6. Pad carbonless paper
7. Drill paper stock for a 3-ring binder
8. Fold paper using a folding machine
9. Hand fold, collate, and staple a booklet
10. Score a job

Academic and Workplace Skills
(Classifications and Definitions)

Foundation Skills

Skill Groups	Sub Skills	Definitions
Basic Skills	Reading	Comprehending written information and analyzing, summarizing, and applying what has been read to a specific task.
	Writing	Communicating a thought, idea, or fact in written form in a clear, concise manner.
	Arithmetic/ mathematics	Performing basic computations, applying estimating and reasoning skills, and solving practical problems using a variety of mathematical techniques.
	Science	Applying knowledge learned through study or practice that is based on scientific principles, methods, and techniques.
	Listening	Receiving, interpreting, and responding to oral messages and other cues.
	Speaking	Communicating a thought, idea, or fact orally in a clear, concise manner.
Thinking Skills	Creative thinking	Using imagination to generate new ideas.
	Decision making	Specifying goals and constraints, generating alternatives, considering risks, and evaluating and choosing the best alternative.
	Problem solving	Recognizing and defining problems, devising and implementing plan of action, and tracking and evaluating results.
	Seeing things in the mind's eye	Mentally organizing and processing symbols, pictures, graphs, and other information.
	Knowing how to learn	Using efficient learning techniques to acquire and apply new knowledge and skills.
	Reasoning	Applying a rule or principle underlying the relationship between two or more objects when solving a problem.
Personal Management Skills	Responsibility	Exerting a high level of effort towards goal attainment, working hard to become excellent at doing tasks by setting high standards, paying attention to details, and displaying a high level of concentration.
	Self-esteem	Developing self-confidence and creating a positive self-image.
	Career awareness, development, and mobility	Assessing self accurately, setting personal goals, establishing and implementing a plan, and monitoring progress.
	Integrity/honesty	Choosing an ethical course of action when faced with making a decision that may break with personal or societal values and recognizing the impact of violating these beliefs and codes on an organization, self, and others.
	Organizational effectiveness	Adapting to the organization's goals, values, culture, and traditional modes of operation.

Competencies

Skill Groups	Sub Skills	Definitions
Resources	Time	Selecting relevant, goal-related activities, ranking them in order of importance, allocating time, and understanding, preparing, and following schedules.
	Money	Using or preparing budgets, making forecasts, keeping records, and making adjustments to meet objectives.
	Material and facilities	Acquiring, storing and using materials and space efficiently.
	Human resources	Assessing skills and distributing work accordingly; evaluating performance and providing feedback.
Interpersonal Skills	Teamwork	Working cooperatively with others to reach a common goal.
	Coaching	Helping others learn new skills.
	Leadership	Communicating ideas to justify position; accepting responsibility for others; and encouraging, persuading, convincing, or otherwise motivating an individual or group.
	Negotiation	Resolving conflict between two or more individuals through discussion and compromise.
	Customer service	Working and communicating with customers to satisfy their expectations.
	Cultural diversity	Working well with men and women and with a variety of ethnic, social, or educational backgrounds.
Information	Acquisition and evaluation	Identifying need for data, obtaining it from existing sources or creating it, and evaluating its relevance and accuracy.
	Organization and storage	Organizing, processing, and maintaining written or computerized records and other forms of information in a systematic way.
	Interpretation	Selecting and analyzing information and communicating the results to others.
	Processing	Using computers to acquire, organize, analyze, and communicate information.
Systems	Interrelationships	Knowing how social, organizational, and technological systems work and operate effectively.
	Monitoring	Distinguishing trends, predicting impact of actions on system operations, diagnosing deviations in systems' performance, and correcting malfunctions.
	Modification and design	Making suggestions to modify existing systems to improve products or services, and developing new or alternative systems.
Technology	Selection	Choosing procedures, tools, or equipment including computers and related technologies.
	Application	Demonstrating proper procedures for setting up and operating equipment.
	Maintenance and troubleshooting	Preventing, identifying, or solving problems with equipment, including computers and other technologies.

Related Academic and Workplace Skills List
For *Graphic Arts*
The Press and Finishing Processes

Task	Skill Group	Sub Skill	Description
Unit I: Offset Press Systems			
Test basic theory of offset printing (J.S. 1)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
		Writing	Composes and creates a report; applies rules of grammar, punctuation, capitalization, and spelling
		Science	Demonstrates understanding of basic chemistry principles
	Thinking Skills	Creative thinking	Combines ideas or information in a new way
		Reasoning	Uses logic to draw conclusions
		Problem solving	Recognizes/defines problem and identifies possible reasons for problem
Unit II: Offset Inks and Dampening Chemistry			
Conduct an ink cabinet inventory (A.S. 1)	Basic Skills	Reading	Follows written directions
		Writing	Organizes information into an appropriate format; writes/prints legibly
	Resources	Material and facilities	Maintains accurate inventory of supplies
Conduct an inventory of offset press dampening chemistry (A.S. 2)	Basic Skills	Reading	Follows written directions; applies what has been read to a specific task
		Writing	Organizes information into an appropriate format; writes/prints legibly
	Resources	Material and facilities	Maintains accurate inventory of supplies
Mix dampening solution and test for pH (J.S. 1)	Basic Skills	Reading	Follows written directions; comprehends written information and applies it to a task; uses chart to obtain factual information
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
Mix PMS colors and conduct and evaluate an ink draw-down or smear (J.S. 2)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Problem solving	Draws conclusions from observations and evaluates conditions
	Resources	Material and facilities	Keeps work area clean

Task	Skill Group	Sub Skill	Description
Unit II: Offset Inks and Dampening Chemistry (cont.)			
Mix two colors of ink to produce a third color (J.S. 3)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Problem solving	Draws conclusions from observations and evaluates conditions
	Resources	Material and facilities	Keeps work area clean
Unit III: Offset Press Operating Procedures			
Compare control features of offset presses (A.S. 1)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
		Writing	Takes notes from various sources; writes/prints legibly
	Thinking Skills	Reasoning	Sees relationship between two or more ideas, objects or situations
Set up the sheet control systems (J.S. 1)	Basic Skills	Reading	Reads and follows instructions in operator's manual to set up equipment
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedures for setting up equipment
Set up the image control systems (J.S. 2)	Basic Skills	Reading	Reads and follows instructions in operator's manual to set up equipment
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedures for setting up equipment
Operate an offset press from set up of systems through printed sheet delivery (J.S. 3)	Basic Skills	Reading	Reads and follows instructions in operator's manual to set up and operate equipment
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions

Related Academic and Workplace Skills

Task	Skill Group	Sub Skill	Description
Unit III: Offset Press Operating Procedures (cont.)			
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Perform a color wash on an offset press (J.S. 4)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Print envelopes (J.S. 5)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Change press from envelopes to letterhead (J.S. 6)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment

Unit III: Offset Press Operating Procedures (cont.)

Task	Skill Group	Sub Skill	Description
Print a two-color job (J.S. 7)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Print a work-and-turn (J.S. 8)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Print halftones and screen tints (J.S. 9)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Print solids (J.S. 10)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Reasoning	Applies rules and principles to a new situation

Related Academic and Workplace Skills

Task	Skill Group	Sub Skill	Description
Unit III: Offset Press Operating Procedures (cont.)			
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Perform perforation and scoring (J.S. 11)	Basic Skills	Reading	Follows written directions; analyzes and applies what has been read to a specific task
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Unit IV: Preventive Maintenance and Troubleshooting			
Use a troubleshooting guide to find the best solution to an ink and dampening problem (A.S. 1)	Basic Skills	Reading	Follows written directions; uses table to obtain factual information; analyzes and applies what has been read to a specific task
		Writing	Presents answers/conclusions in a clear and understandable form
	Thinking Skills	Problem solving	Recognizes/defines problem; draws conclusions from observations and gives possible solution
Use a troubleshooting guide to find the best solution to a paper stock problem (A.S. 2)	Basic Skills	Reading	Follows written directions; uses table to obtain factual information; analyzes and applies what has been read to a specific task
		Writing	Presents answers/conclusions in a clear and understandable form
	Thinking Skills	Problem solving	Recognizes/defines problem; draws conclusions from observations and gives possible solution
Use a troubleshooting guide to find the best solution to a process problem (A.S. 3)	Basic Skills	Reading	Follows written directions; uses table to obtain factual information; analyzes and applies what has been read to a specific task

Unit IV: Preventive Maintenance and Troubleshooting (cont.)

Task	Skill Group	Sub Skill	Description
		Writing	Presents answers/conclusions in a clear and understandable form
	Thinking Skills	Problem solving	Recognizes/defines problem; draws conclusions from observations and gives possible solution
Use a troubleshooting guide to find the best solution to a mechanical problem (A.S. 4)	Basic Skills	Reading	Follows written directions; uses table to obtain factual information; analyzes and applies what has been read to a specific task
		Writing	Presents answers/conclusions in a clear and understandable form
	Thinking Skills	Problem solving	Recognizes/defines problem; draws conclusions from observations and gives possible solution
Determine lubrication requirements for a specific press (A.S. 5)	Basic Skills	Reading	Follows written directions; uses written resources to obtain factual information
		Writing	Organizes information into an appropriate format; writes/prints legibly
Set up a preventive maintenance schedule in chart form (A.S. 6)	Basic Skills	Reading	Follows written directions; uses written resources to obtain factual information
		Writing	Organizes information into an appropriate format; presents information in a clear and understandable form; writes/prints legibly
		Reasoning	Uses logic to draw conclusions from available information
	Thinking Skills	Creative thinking	Combines ideas or information in a new way
Take an inventory of spare parts (A.S. 7)	Basic Skills	Reading	Follows written directions
		Writing	Writes/prints legibly
	Resources	Material and facilities	Maintains accurate inventory of parts
Adjust dampener rollers to plate cylinder (J.S. 1)	Basic Skills	Reading	Reads and follows instructions in operator's manual to adjust equipment
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean

Task	Skill Group	Sub Skill	Description
Unit IV: Preventive Maintenance and Troubleshooting (cont.)			
	Technology	Application	Demonstrates proper procedure for adjusting equipment
		Maintenance and troubleshooting	Performs maintenance procedures to keep equipment operating correctly
Adjust ink form rollers to plate cylinder (J.S. 2)	Basic Skills	Reading	Reads and follows instructions in operator's manual to adjust equipment
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for adjusting equipment
		Maintenance and troubleshooting	Performs maintenance procedures to keep equipment operating correctly
Adjust plate cylinder to blanket cylinder (J.S. 3)	Basic Skills	Reading	Reads and follows instructions in operator's manual to adjust equipment
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for adjusting equipment
		Maintenance and troubleshooting	Performs maintenance procedures to keep equipment operating correctly
Adjust blanket cylinder to impression cylinder (J.S. 4)	Basic Skills	Reading	Reads and follows instructions in operator's manual to adjust equipment
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
		Problem solving	Draws conclusions from observations and evaluates conditions and corrects situation
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for adjusting equipment

Task	Skill Group	Sub Skill	Description
Unit IV: Preventive Maintenance and Troubleshooting (cont.)			
		Maintenance and troubleshooting	Performs maintenance procedures to keep equipment operating correctly
Change a molleton cover (J.S. 5)	Basic Skills	Reading	Follows written directions
	Resources	Material and facilities	Uses equipment and materials correctly; keeps equipment and work area clean; demonstrates safe use of equipment and materials
	Technology	Maintenance and troubleshooting	Performs routine tasks related to equipment maintenance
Degrease plate and impression cylinders (J.S. 6)	Basic Skills	Reading	Follows written directions
	Resources	Material and facilities	Uses equipment and materials correctly; keeps equipment and work area clean; demonstrates safe use of equipment and materials
	Technology	Maintenance and troubleshooting	Performs routine tasks related to equipment maintenance
Deglaze ink rollers and blanket (J.S. 7)	Basic Skills	Reading	Follows written directions
	Resources	Material and facilities	Uses equipment and materials correctly; keeps equipment and work area clean; demonstrates safe use of equipment and materials
	Technology	Maintenance and troubleshooting	Performs routine tasks related to equipment maintenance
Change blanket (J.S. 8)	Basic Skills	Reading	Follows written directions
	Resources	Material and facilities	Uses equipment and materials correctly; keeps equipment and work area clean; demonstrates safe use of equipment and materials
	Technology	Maintenance and troubleshooting	Performs routine tasks related to equipment maintenance
Backflush vacuum pump (J.S. 9)	Basic Skills	Reading	Reads and follows instructions in operator's manual to maintain equipment
	Resources	Material and facilities	Uses materials and supplies correctly; keeps work area clean
	Technology	Maintenance and troubleshooting	Performs routine tasks related to equipment maintenance

Related Academic and Workplace Skills

Task	Skill Group	Sub Skill	Description
Unit V: Job Ticket and Cost Awareness			
Estimate costs of printing jobs (A.S. 1)	Basic Skills	Reading	Identifies relevant details, facts, and specifications
		Math	Calculates dollar amounts; performs basic computations
	Resources	Money	Determines cost to complete a task
Unit VI: Calculating Paper Cutting			
Use the formula for cutting paper stock (A.S. 1)	Basic Skills	Reading	Identifies relevant details, facts, and specifications
		Math	Computes using a formula to determine maximum yield
	Thinking Skills	Decision making	Evaluates data to make best decision
	Resources	Material and facilities	Uses materials wisely to reduce waste
Use the formula to determine how many sheets will be required (A.S. 2)	Basic Skills	Reading	Identifies relevant details, facts, and specifications
		Math	Computes using a formula to determine maximum yield
	Thinking Skills	Decision making	Evaluates data to make best decision
	Resources	Material and facilities	Uses materials wisely to reduce waste
Calculate combination cut using stock cutting formula (A.S. 3)	Basic Skills	Reading	Identifies relevant details, facts, and specifications
		Math	Computes using a formula to determine maximum yield
	Thinking Skills	Decision making	Evaluates data to make best decision
	Resources	Material and facilities	Uses materials wisely to reduce waste
Draw a cutting diagram (A.S. 4)	Basic Skills	Reading	Follows written directions; identifies relevant details, facts, and specifications
		Math	Computes using a formula to determine maximum yield; applies math principles to complete a drawing
Cut carbonless paper (J.S. 1)	Basic Skills	Reading	Reads and follows instructions to operate equipment
	Thinking Skills	Problem solving	Draws conclusions from observations and evaluates results

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Task	Skill Group	Sub Skill	Description
Unit VI: Calculating Paper Cutting (cont.)			
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Unit VII: Binding and Finishing			
Pad 20-pound stock (J.S. 1)	Basic Skills	Reading	Reads and follows instructions to operate equipment
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Pad carbonless paper (J.S. 2)	Basic Skills	Reading	Reads and follows instructions to operate equipment
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Drill paper stock for a three-ring binder (J.S. 3)	Basic Skills	Reading	Reads and follows instructions to operate equipment
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Fold paper using folding machine (J.S. 4)	Basic Skills	Reading	Reads and follows instructions to operate equipment
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
Hand fold, collate, and staple a booklet (J.S. 5)	Basic Skills	Reading	Reads and follows instructions to operate equipment
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment

Task	Skill Group	Sub Skill	Description
Unit VII: Binding and Finishing (cont.)			
	Thinking Skills	Reasoning	Applies rules and principles to a new situation
Score a job (J.S. 6)	Basic Skills	Reading	Reads and follows instructions to operate equipment
	Resources	Material and facilities	Uses equipment and materials correctly; demonstrates safe use of equipment and materials; keeps work area clean
	Technology	Application	Demonstrates proper procedure for setting up and operating equipment
	Thinking Skills	Reasoning	Applies rules and principles to a new situation

Graphic Arts
The Press and Finishing Processes

Tools, Equipment, and Materials List

Abrasive cleaner
Adhesive perforation and scoring material
Adjustment wrench
Allen wrench

Blanket powder
Blanket wash
Bond paper
Box end wrench

Carbonless paper
Chipboard
Chrome cylinder cleaner
Cleaner
Cleanup mats
Cleanup solvent
Cotton pads, clean

Dampening gauges, .005
Deglazer
Degreaser
Distilled water

Electronic pH meter
Envelope stock

Folding machine
Fountain solution

Ink knife
Ink scale
Installation sleeve

Jogging machine

Mixing containers
Molleton cover, new

Offset blankets
Offset plates
Offset press
Offset press inks (various colors)
Operator manuals

Padding brush
Padding compound
Padding press
Paper
Paper cutter
Paper drill
Pen or pencil

pH test strips
Plate cleaner
Plate etch
PMS color formula guide
Preservatives
Press with operator's manual

Roller conditioner-cleaner

Scoring machine
Screwdriver
Shop towels
Solvent/oil mixture
Sponge rubber buffer
Standard tools
Stapler

Talcum powder

Water miscible cleaner
Wood block

Graphic Arts
The Press and Finishing Processes

References

Anton, Karl V., Jr. *Handbook of Technical Articles.* Mineola, NY: Van Son Holland Ink Corp. of America.

ATF Chief 15-7 Operator's Manual. Whittensville, MA: American Type Founders.

ATF Chief Operating Instructions. Whittensville, MA: American Type Founders.

Bentley, R.G.; J.C. Olson; C.E. Strandberg; and R.E. Wiper. *Graphics Communications Series: Transparency Originals.* Rochester, NY: Itek Grafix Corp.

Cogoli, John E. *Photo-Offset Fundamentals.* Old Tappan, NJ: Macmillan Publishing Co., Inc. 1986.

Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts.* Old Tappan, NJ: MacMillan Publishing Co., Inc., 1983.

Easy Does It. St. Paul, MN: 3M Company, Industrial Graphics Department, Printing Products Division.

Franklin Offset Catalog. Salt Lake City, UT: Porte Publishing Co.

Graphics Master 6. Kihei, HI: Dean Lem Associates, Inc., 1996.

Grimes, L.A., Jr., *Offset Printer, Coordinator's Guide.* Austin, TX: Instructional Materials Center, Division of Extension, The University of Texas at Austin.

Hird, Kenneth F. *Offset Lithographic Technology.* Tinley Park, IL: Goodheart-Willcox Publisher, 1995.

How to Be a Smooth Operator. St. Paul, MN: 3M Company, Printing Products Division.

Lankford, William. *The Offset Press Dampening System.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1980.

The Lithographers Manual. Ninth Edition. Ed Thomas M. Destree. Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.

Models 350 and 360 Offset Duplicators Operating Instructions. Rochester, NY: Itek Grafix Corp.

Operation Manual. Heidelberg Offset, Heidelberg, Germany: Heidelberger Druckmaschinen Aktiengesellschaft.

Operation Manual 975/CPD. Rochester, NY: Itek Grafix Corp., 1987.

Operation Manual 3985. Rochester, NY: Itek Grafix Corp., 1987.

1250 Offset Operator Manual. Mt. Prospect, IL: AM International, Inc., 1989.

Press Operator's Guide. St. Paul, MN: 3M Company, 1989.

Pocket Pal, A Graphic Arts Production Handbook. Memphis, TN: International Paper Co., 1992.

Prust, Z.A. *Photo-Offset Lithography.* Tinley Park, IL: Goodheart-Willcox Publisher, 1977.

Safety Practices for the Graphic Arts. Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

1650 Series Operator Manual. Mt. Prospect, IL: AM International, Inc. 1987.

Silver, Gerald A. *Printing Estimating Policies & Procedures.* Encino, CA: Editorial Enterprises, 1991.

Spence, William D. and David G. Vequist. *Graphic Reproduction.* Westerville, OH: Glencoe McGraw-Hill, 1980.

Teachers Guide for Training Offset Duplicator Operators. Cleveland, OH: Addressograph-Multigraph Corp., Education Division.

OFFSET PRESS SYSTEMS
UNIT I

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to the teaching of this unit.)

B. Make transparencies from the transparency masters included with this unit.

C. Discuss objective sheet, unit objectives, and specific objectives.

D. Discuss information sheet. Note Student Supplement 1 on Objectives 14 and 15.

(NOTE: Use the transparencies to enhance the information as needed.)

E. Discuss and demonstrate the procedure outlined in the job sheet. Assign the job sheet project. Evaluate student performance according to criteria on job sheet.

F. Integrate the following activities throughout the teaching of this unit:

1. Demonstrate various components and systems of the offset press using your classroom or local job-shop press as an example.

2. Demonstrate offset press systems by printing a job at slow speed.

3. Invite manufacturers, industry representatives, and printing professionals to give demonstrations and/or describe products, equipment, and processes.

4. Ask students to visit a print shop and prepare a report on the presses and systems observed.

5. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.

SUGGESTED ACTIVITIES

RESOURCES USED IN DEVELOPING THIS UNIT

A. Bentley, R.G.; J.C. Olson; C.E. Strandberg; and R.E. Wiper. *Graphic Communications Series: Transparency Originals*. Chicago, IL: A. B. Dick Company.

B. Cogoli, John E. *Photo Offset Fundamentals*. Old Tappan, NJ: MacMillan Publishing Co., Inc., 1986.

C. Dennis, Ervin A. and John D. Jenkins. *Comprehensive Graphic Arts*. Old Tappan, NJ: MacMillan Publishing Co., Inc., 1983.

D. Grimes, I. A., Jr., *Offset Printer,* Coordinator's Guide. Austin, TX: Instructional Materials Center, Division of Extension, The University of Texas at Austin, 1976.

E. Hird, Kenneth F. *Offset Lithographic Technology*. Tinley Park, IL: Goodheart-Willcox Publisher, 1995.

F. Spence, William P. and David G. Vequist. *Graphic Reproduction*. Westerville, OH: Glencoe McGraw-Hill, 1980.

SUGGESTED SUPPLEMENTAL MATERIAL

Text -- *The Lithographers Manual,* Ninth Edition, Ed. Thomas M. Destree, Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.

Slides – *Presswork and Bindery* (5032). 51 color, 35mm slides, 1986.

Text and slides available from:

Graphic Arts Technical Foundation
4615 Forbes Avenue
Pittsburgh, PA 15213-3796
(412) 621-6941
www.gatf.com/products.html
or
E-mail: Training@gatf.lm.com

OFFSET PRESS SYSTEMS
UNIT I

TEST

Name ________________________________ **Score** ____________________

1. Match the terms on the right relating to offset press systems with their correct definitions.

______a. In modern lithography, the procedure of transferring a right-reading image (plate cylinder) to an intermediate carrier (blanket cylinder) where it becomes wrong reading, then transferring that image to a receiver (paper stock) where it again becomes right reading

______b. To print the image in the exact same position on each sheet of paper

______c. The operation of an offset press in controlling the paper after the image is printed

______d. Suction created through the sucker tube(s) by a vacuum pump intake

______e. A flat surface on which the sheet of paper is positioned between the feeder and cylinder systems

______f. A chemical mixture applied to the nonimage areas of an offset plate to repel ink

______g. The process of printing from a flat surface with the image and nonimage areas separated by chemistry

______h. A substance applied to the image areas of an offset plate for transfer to the blanket and then to the paper

______i. A piece of printing equipment which holds a roll or stack of paper, controls that paper through the process of imprinting an image on its surface, and delivers the paper to a stack or roll for further processing

1. Delivery
2. Fountain solution
3. Ink
4. Offset
5. Offset press
6. Offset printing
7. Register
8. Register board
9. Vacuum

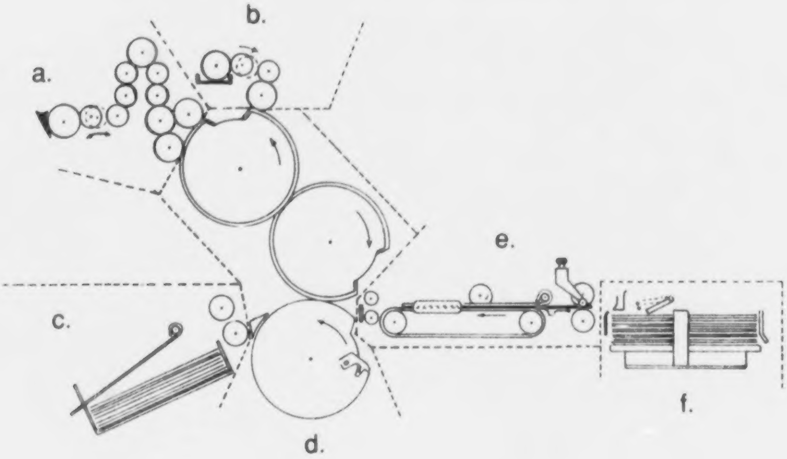
TEST

2. State the basic theory of offset printing.

____

____

3. Identify the basic systems of a typical sheet fed offset press.



a. ______________ ______________ d. ______________________

b. ______________________ e. ______________________

c. ______________________ f. ______________________

4. Match the basic systems of a typical sheet fed offset press with their functions.

_____a. Controls the feeding of paper stock, either from a roll or as a single sheet from a stack

_____b. Controls the positioning of the paper being fed through the press so that the image will print in the exact same position on each sheet

_____c. Controls the paper after the image is printed by stacking or rewinding as a roll to facilitate further processing

1. Inking system
2. Feeder system
3. Delivery system
4. Dampening system
5. Cylinder system
6. Register system

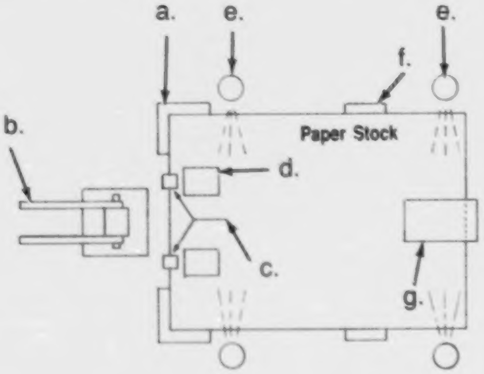
TEST

______d. A set of three cylinders (or their equivalent) which control the transfer of the image from the offset plate to the paper being fed through the press

______e. A reservoir (fountain) of ink and related rollers which control ink distribution to the image areas of the offset plate

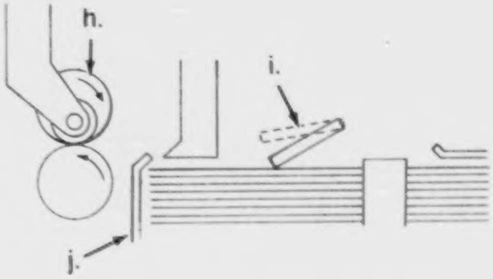
______f. A reservoir (fountain) of dampening solution and related rollers which control its distribution to the nonimage areas of the offset plate

5. Identify the components of the feeder system of a typical offset press.



Top View of Feeder System

Side View of Feeder



a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

g. ______________________________

h. ______________________________

i. ______________________________

j. ______________________________

TEST

6. Match components of the feeder system on the right with their functions.

_____a. A free turning roller which rotates in contact with a gear driven roller to pull the sheet of paper from the sucker tube(s) and deliver it to the register system

_____b. Blows air from the discharge side of a vacuum pump through one or more tubes into the edges of the top few sheets of paper on the feed table to control sheet separation for pickup of a single sheet by the sucker tube(s)

_____c. Small, thin, narrow, flexible metal finger which is positioned against the leading edge of the paper pile and has the tip end bent to fit over the top of the leading edge about 1/4"; it aids in the feeding of one sheet at a time by separating top sheet from a second or more sheets, which remain on top of the pile

_____d. A device which automatically controls the height at which the pile of paper will be maintained for continuous feeding into the press

_____e. Holds a stack or pile of paper in position for feeding into the press

_____f. A movable tube through which a vacuum pump draws air causing a sheet of paper to be drawn into contact with the tube, which then moves the sheet into the press

_____g. A device which gauges the thickness of the paper before it is fed into the register system and provides a means of stopping or deflecting the paper if two or more sheets are picked up by the sucker tube(s)

_____h. Position the sheets that are stacked on the feed table by holding the paper on the sides and at the leading and trailing edges in exact position for entering the press

1. Double sheet detector
2. Feed table
3. Paper guides
4. Sheet separator
5. Vacuum sucker tube
6. Air blast nozzle
7. Pull out roller
8. Pile height regulator

TEST

7. Match the types of feeder systems used on offset presses on the right with their operations.

(NOTE: Answers may be used more than once.)

______a. Each sheet is picked up at the trailing edge and pushed underneath the previous sheet.

______b. Pick up of the next sheet can be made immediately as the trailing edge moves toward the register system.

______c. Each sheet is picked up at the gripper edge after the trailing edge of the previous sheet moves past the sucker tubes.

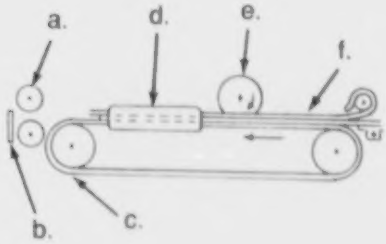
______d. Several overlapping sheets will be in position on the register board at one time.

______e. The paper is mounted as a roll on the feeder system and can be delivered from the press as single sheets or rewound as a roll.

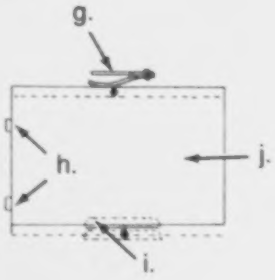
1. Roll or web feed
2. Stream feed
3. Sheet feed

8. Identify the components of the register system of a typical offset press. Write the answers in the blanks on the next page.

Side View



Top View



TEST

a. ______________________ f. ______________________

b. ______________________ g. ______________________

c. ______________________ h. ______________________

d. ______________________ i. ______________________

e. ______________________ j. ______________________

9. Match components of the register system on the right with their functions.

_____a. Maintains paper in position to enter feed roller

_____b. A thin, narrow flexible strip of metal the length of the register board which lies on top of a sheet of paper with a conveyor tape underneath to prevent sheet buckle

_____c. Adjusts the tension on the sheet hold down strip

_____d. A set of guides to stop the forward motion of the sheet of paper so it may be positioned by the side guides

_____e. A set of tapes or tracks which lie flat on the register board, and rotate around the board to move the paper through the register system

_____f. A free turning roller which moves in and out of contact with a gear-driven roller during each revolution of the press to move the sheet of paper from its register board position into the cylinder grippers

_____g. Positions paper to correctly enter feed roller; adjusts to width of paper

1. Feed roller
2. Paper stops
3. Conveyor tapes
4. Jogger side guide
5. Control wheel
6. Sheet hold down strip
7. Fixed side guide

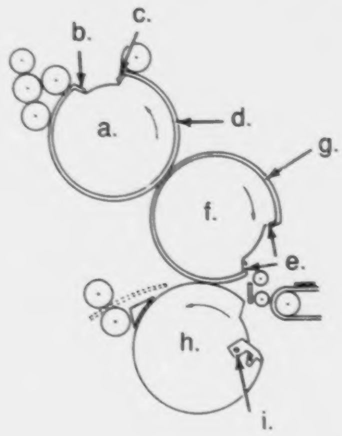
10. Name the two types of register systems used on sheet fed offset presses.

a. ____

b. ____

TEST

11. Identify the components of the cylinder system of a typical offset press.



a. ____________________

b. ____________________

c. ____________________

d. ____________________

e. ____________________

f. ____________________

g. ____________________

h. ____________________

i. ____________________

12. Match components of the cylinder system on the right with their functions.

_____a. The part of an offset press which contains a rubber blanket to receive the image from the plate

_____b. Metal-image bearing surface which, treated with dampening solution and ink, imparts a printing image to the blanket roller

_____c. The part of a plate cylinder which grips with pressure or holds the leading edge of the offset plate to secure its position on the cylinder

_____d. Several metal fingers attached to a shaft on the impression cylinder which grip the leading edge of the sheet of paper as it passes through the cylinder system

1. Plate cylinder
2. Tail clamp
3. Head clamp
4. Plate
5. Blanket clamps
6. Blanket cylinder
7. Blanket
8. Impression cylinder
9. Sheet grippers

TEST

______e. A thick sheet of rubber laminated to a backing sheet (usually canvas) that fits on the surface of the blanket cylinder

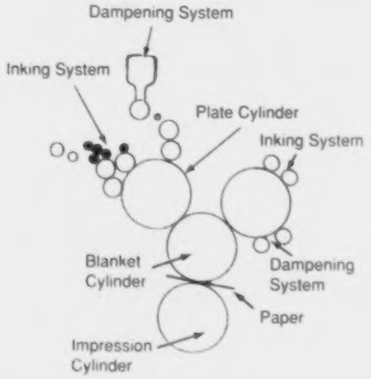
______f. The parts of the blanket cylinder which hold the blanket secure in position and around the cylinder

______g. The part of a plate cylinder which holds the trailing edge of the offset plate to secure its position on the cylinder

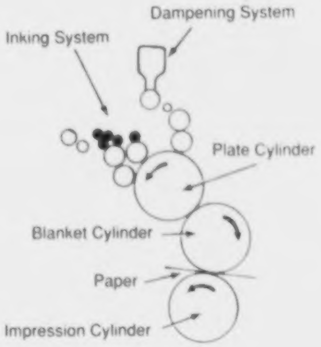
______h. The part of an offset press which applies pressure for image transfer to the paper

______i. The part of an offset press which holds the offset plate

13. Identify offset press cylinder arrangements.

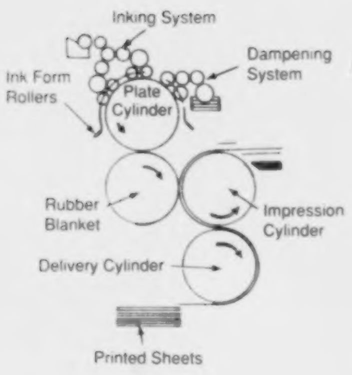


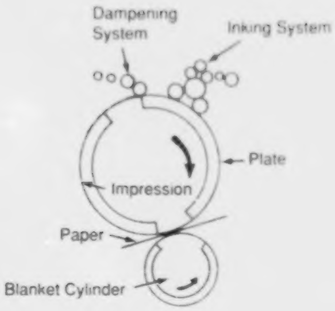
a. ______________________________



b. ______________________________

TEST


Inking System
Dampening System
Ink Form Rollers
Plate Cylinder
Rubber Blanket
Impression Cylinder
Delivery Cylinder
Printed Sheets


Dampening System
Inking System
Plate
Impression
Paper
Blanket Cylinder

c. ______________________________

d. ______________________________

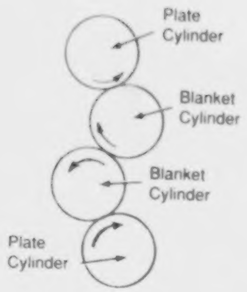


Plate Cylinder
Blanket Cylinder
Blanket Cylinder
Plate Cylinder

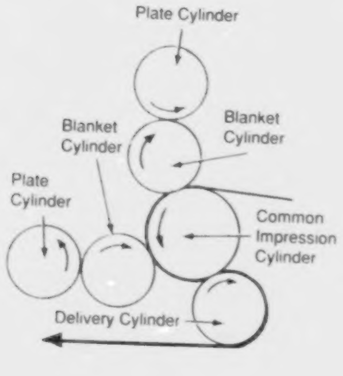


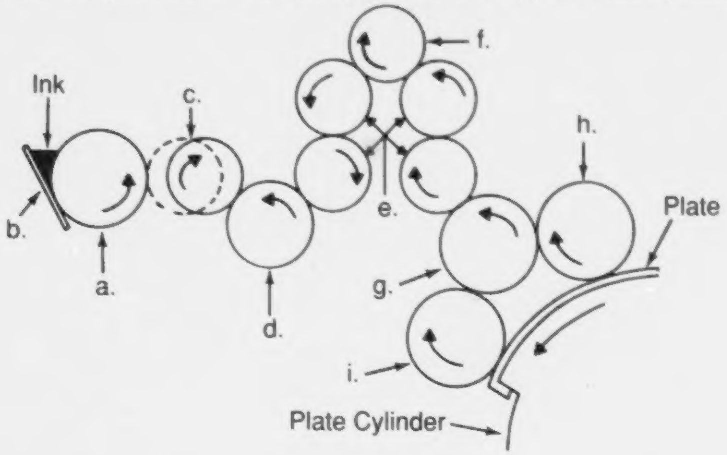
Plate Cylinder
Blanket Cylinder
Blanket Cylinder
Plate Cylinder
Common Impression Cylinder
Delivery Cylinder

e. ______________________________

f. ______________________________

TEST

14. Identify the components of the inking system of a typical offset press.



a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

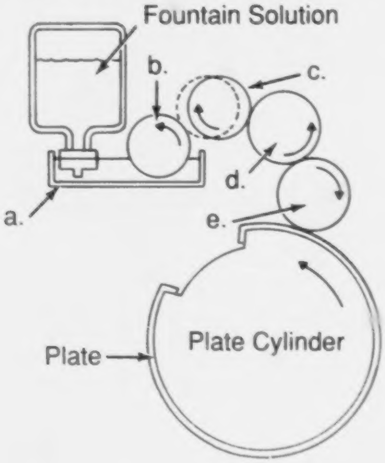
f. ______________________________

g. ______________________________

h. ______________________________

i. ______________________________

15. Identify the components of the dampening system of a typical offset press.



a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

TEST

16. Match components of the inking/dampening system with their functions.

_______a. A tray reservoir which holds a supply of ink or water (fountain solution)

_______b. The roller which rotates in the ink and water fountains respectively to distribute ink and water to each of the systems

_______c. Gear driven or free turning roller which rotates on its axis in contact with other rollers to aid in even distribution of water and ink in the respective systems

_______d. The ink and/or dampening roller which makes contact with the offset plate while it is attached to the plate cylinder

_______e. A free turning roller which contacts other ink rollers to aid in ink distribution

_______f. The intermediate roller which carries ink or water from the respective fountain roller to each system

_______g. A hard surface free-turning roller which moves back and forth on its axis while rotating in contact with other rollers in the ink or water system to evenly distribute the ink or water

1. Fountain roller
2. Fountain
3. Ductor roller
4. Distributor roller
5. Idler roller
6. Vibrator roller
7. Form roller

17. Distinguish between the two types of dampening systems by placing a "C" before descriptions of conventional systems and an "I" before descriptions of integrated systems.

(NOTE: Both systems may apply to one description.)

_______a. Noncovered rollers

_______b. Common ink and water form roller(s) contacting the plate

_______c. Molleton covered rollers

_______d. Paper or cloth sleeve covered rollers

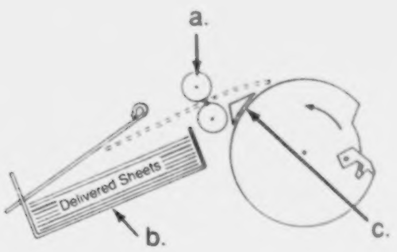
_______e. Separate ink and water form rollers contacting the plate

_______f. Separate ink and water fountains

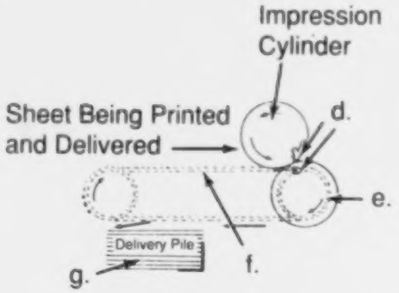
_______g. Parchment covered rollers

TEST

18. Identify the components of the delivery system of a typical offset press.



Tray Delivery



Chain Delivery With Receding Stacker

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ____________________________

f. ____________________________

g. ____________________________

19. Match components of the delivery system with their functions.

______a. A tray with positioning guides which receives the sheet from the cylinder system and holds the paper in a straight stack

______b. A set of gripper fingers mounted on two parallel chains which rotate to pick up the sheet of paper from the cylinder grippers and deliver it to a receiving tray or stacking unit

______c. Revolving chains with mounted gripper bars which transfer the sheet of paper from the cylinder system to a receiving table

______d. Metal finger which is positioned close to the surface of the impression cylinder which prevents the sheet of paper from following the cylinder rotation after the sheet is released to the delivery system

1. Ejector rollers
2. Receiving tray
3. Stripping finger
4. Delivery gripper bars
5. Delivery cylinder
6. Delivery gripper chains
7. Receding stacker

TEST

______e. Rollers which aid in removing the sheet of paper from the impression cylinder and delivering it to the receiving unit

______f. A receiving table attached to the offset press which automatically lowers as sheets of paper are delivered to it

______g. Delivers sheet of paper to stack in receiving tray

20. Match the types of delivery systems on the right with their descriptions.

______a. Paper fed from a roll is rewound after printing.

______b. Paper is delivered to a receiving tray which must be emptied frequently.

______c. Paper is delivered by gripper bars revolving on chains to a table which lowers automatically, allowing many sheets to be stacked.

______d. Paper is delivered and positioned on a table which lowers automatically.

1. Tray
2. Chute with receding stacker
3. Chain
4. Roll or web

*Permission to duplicate this test is granted.**

GIII-T17

OFFSET PRESS SYSTEMS
UNIT I

ANSWERS TO TEST

1.
   - a. 4
   - b. 7
   - c. 1
   - d. 9
   - e. 8
   - f. 2
   - g. 6
   - h. 3
   - i. 5

2. The chemical principle that grease and water do not readily mix

3.
   - a. Inking system
   - b. Dampening system
   - c. Delivery system
   - d. Cylinder system
   - e. Register system
   - f. Feeder system

4.
   - a. 2
   - b. 6
   - c. 3
   - d. 5
   - e. 1
   - f. 4

5.
   - a. Front paper guide
   - b. Double sheet detector
   - c. Sheet separators
   - d. Vacuum sucker tube
   - e. Air blast nozzle
   - f. Side paper guide
   - g. Back paper guide
   - h. Pull out rollers
   - i. Pile height regulator
   - j. Feed table

6.
   - a. 7
   - b. 6
   - c. 4
   - d. 8
   - e. 2
   - f. 5
   - g. 1
   - h. 3

7.
   - a. 2
   - b. 2
   - c. 3
   - d. 2
   - e. 1

8.
   - a. Feed roller
   - b. Paper stop
   - c. Conveyor tape
   - d. Jogger side guide
   - e. Control wheel
   - f. Sheet hold down strip
   - g. Fixed side guide
   - h. Paper stops
   - i. Jogger side guide
   - j. Paper sheet

ANSWERS TO TEST

9. a. 7
b. 6
c. 5
d. 2
e. 3
f. 1
g. 4

10. a. Register board
b. Feeder/buckle

11. a. Plate cylinder
b. Tail clamp
c. Head clamp
d. Plate
e. Blanket clamps
f. Blanket cylinder
g. Blanket
h. Impression cylinder
i. Sheet gripper

12. a. 6
b. 4
c. 3
d. 9
e. 7
f. 5
g. 2
h. 8
i. 1

13. a. Two-color common blanket cylinder
b. Three cylinder
c. Four cylinder
d. Two cylinder
e. Perfector (blanket to blanket)
f. Two-color-common impression cylinder

14. a. Ink fountain roller
b. Ink fountain
c. Ink ductor roller
d. Ink distributor roller
e. Ink idler rollers
f. Ink vibrator roller
g. Ink vibrator roller
h. Ink form roller
i. Ink form roller

15. a. Water fountain
b. Water fountain roller
c. Water ductor roller
d. Water vibrator roller
e. Water form roller

16. a. 2
b. 1
c. 4
d. 7
e. 5
f. 3
g. 6

ANSWERS TO TEST

17. a. C,I
b. I
c. C
d. C
e. C
f. C,I
g. C

18. a. Ejector rollers
b. Receiving tray
c. Stripping finger
d. Delivery gripper bars
e. Delivery cylinder
f. Delivery gripper chains
g. Receding stacker

19. a. 2
b. 4
c. 6
d. 3
e. 1
f. 7
g. 5

20. a. 4
b. 1
c. 3
d. 2

OFFSET PRESS SYSTEMS
UNIT I

UNIT EVALUATION FORM

Student Name ______________________________ Unit Rating ________

Job Sheet Rating

Job Sheet #1—Test Basic Theory of Offset Printing Rating ______

Comments: ____

____

Written-Test Scores

Prestest _____ Posttest _____ Other _____

Other

____

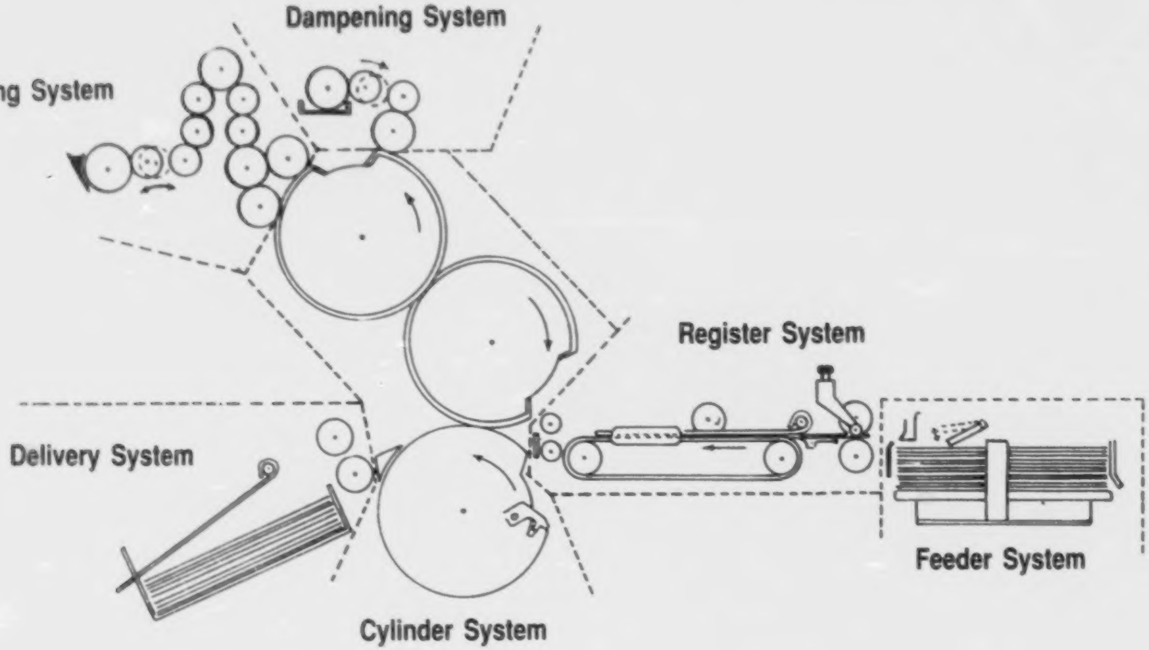
____

Teacher Signature ______________________________ Date ____________

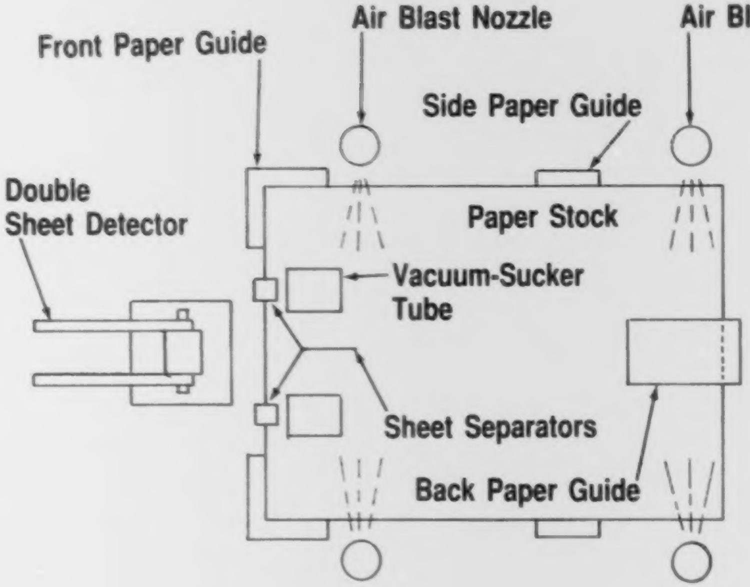
Student Signature ______________________________ Date ____________

***Permission to duplicate this form is granted.**

Basic Systems of a Typical Sheet Fed Offset Press

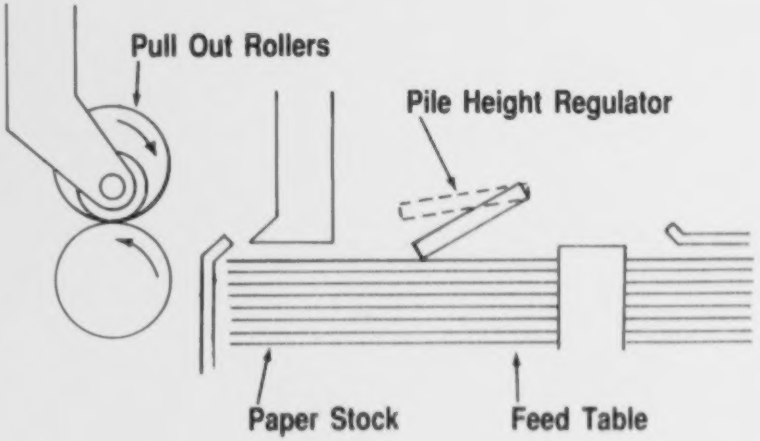


Components of the Feeder System



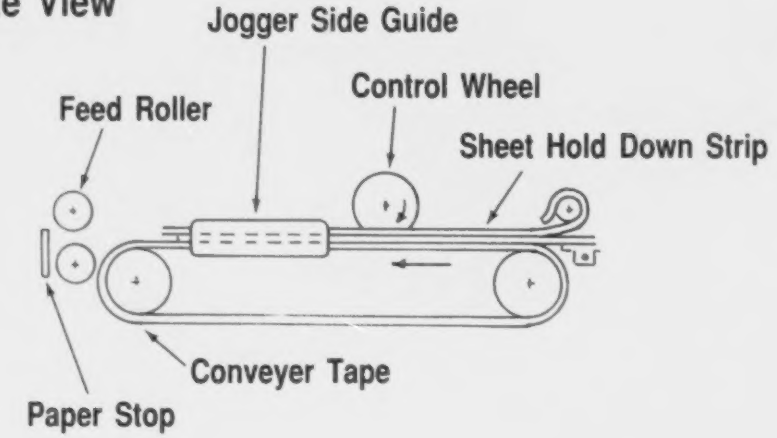
Top View of Feeder System

Side View of Feeder

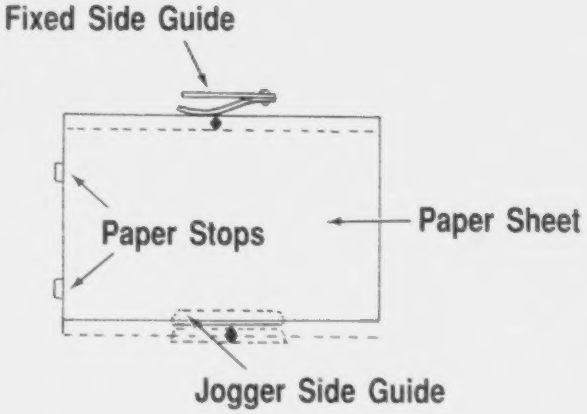


Components of the Register System

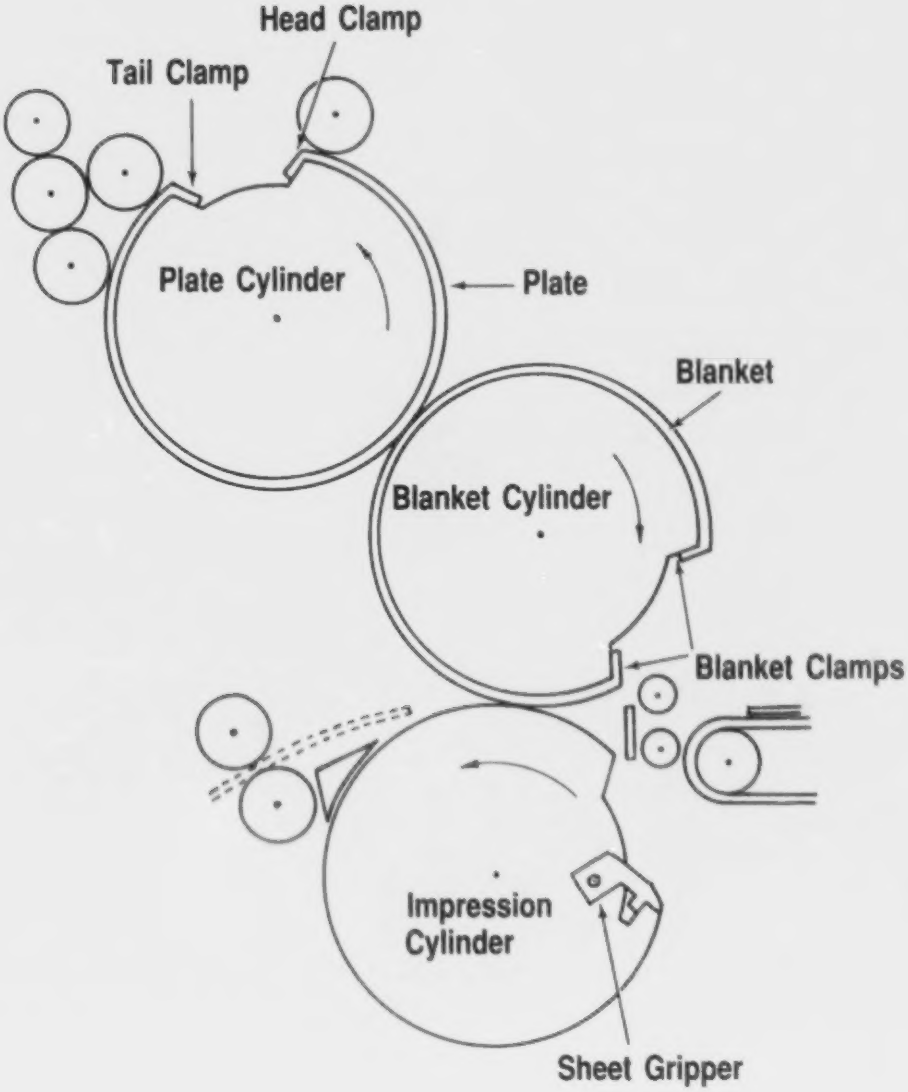
Side View



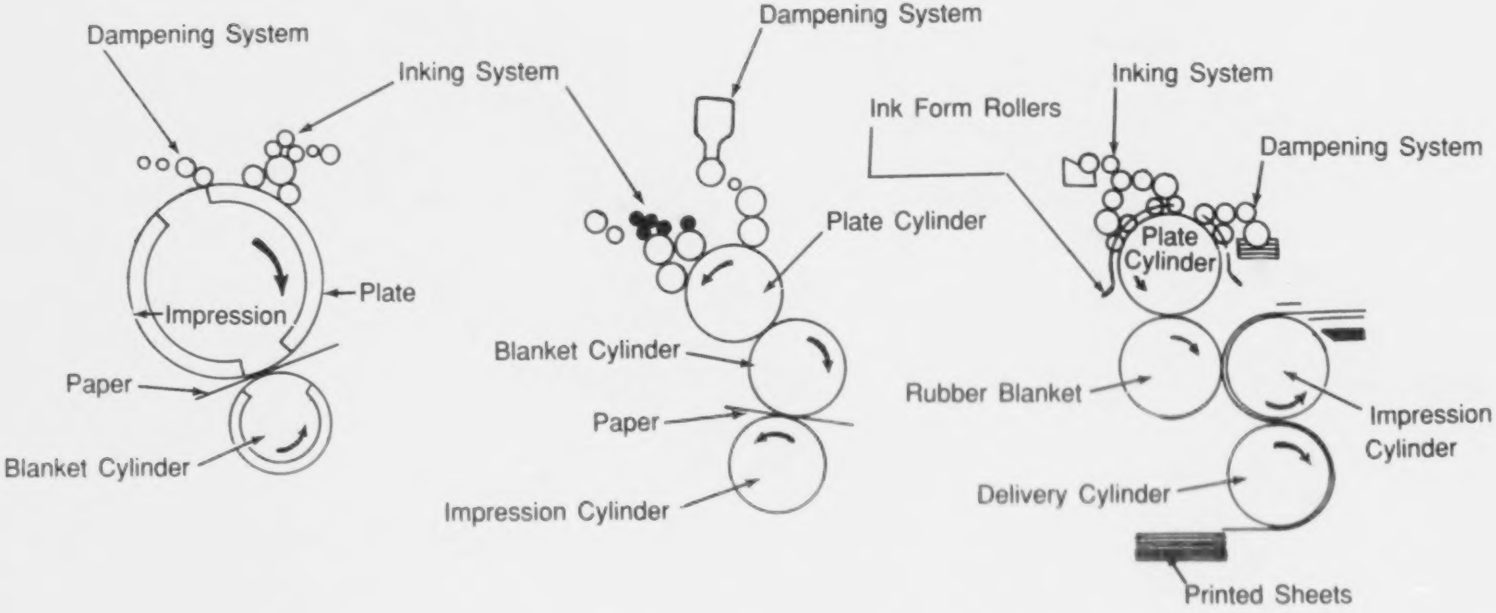
Top View



The Cylinder System



Offset Press Cylinder Arrangements



Two Cylinder **Three Cylinder** **Four Cylinder**

TM 5

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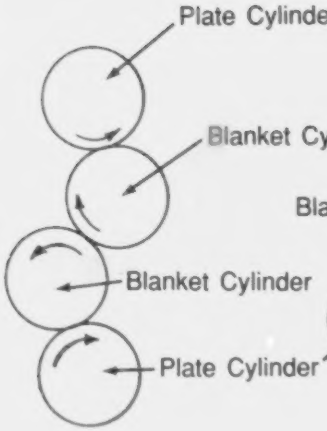
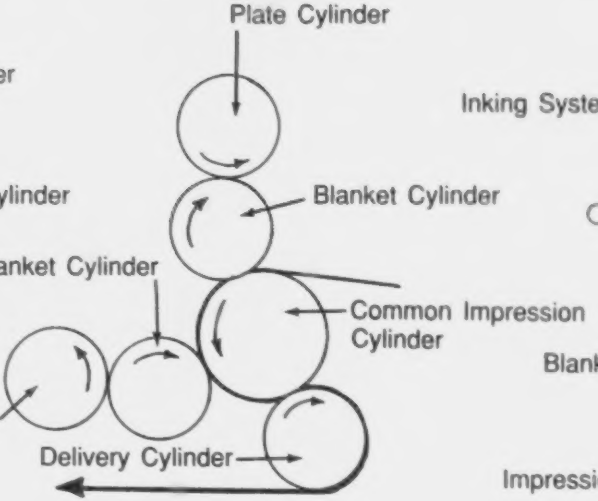
Offset Press Cylinder Arrangements

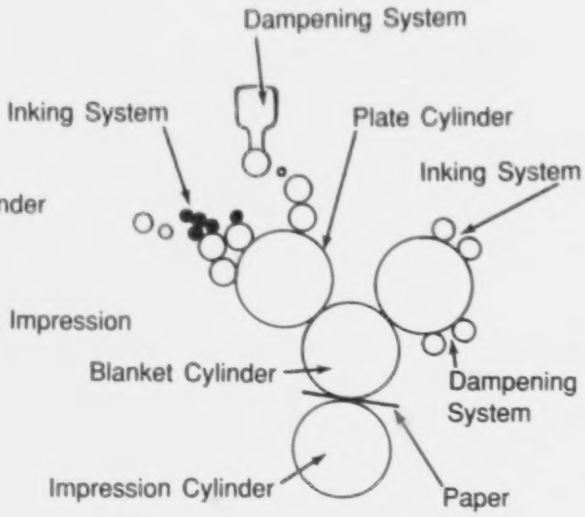
(Continued)



Perfector
(Blanket to Blanket)

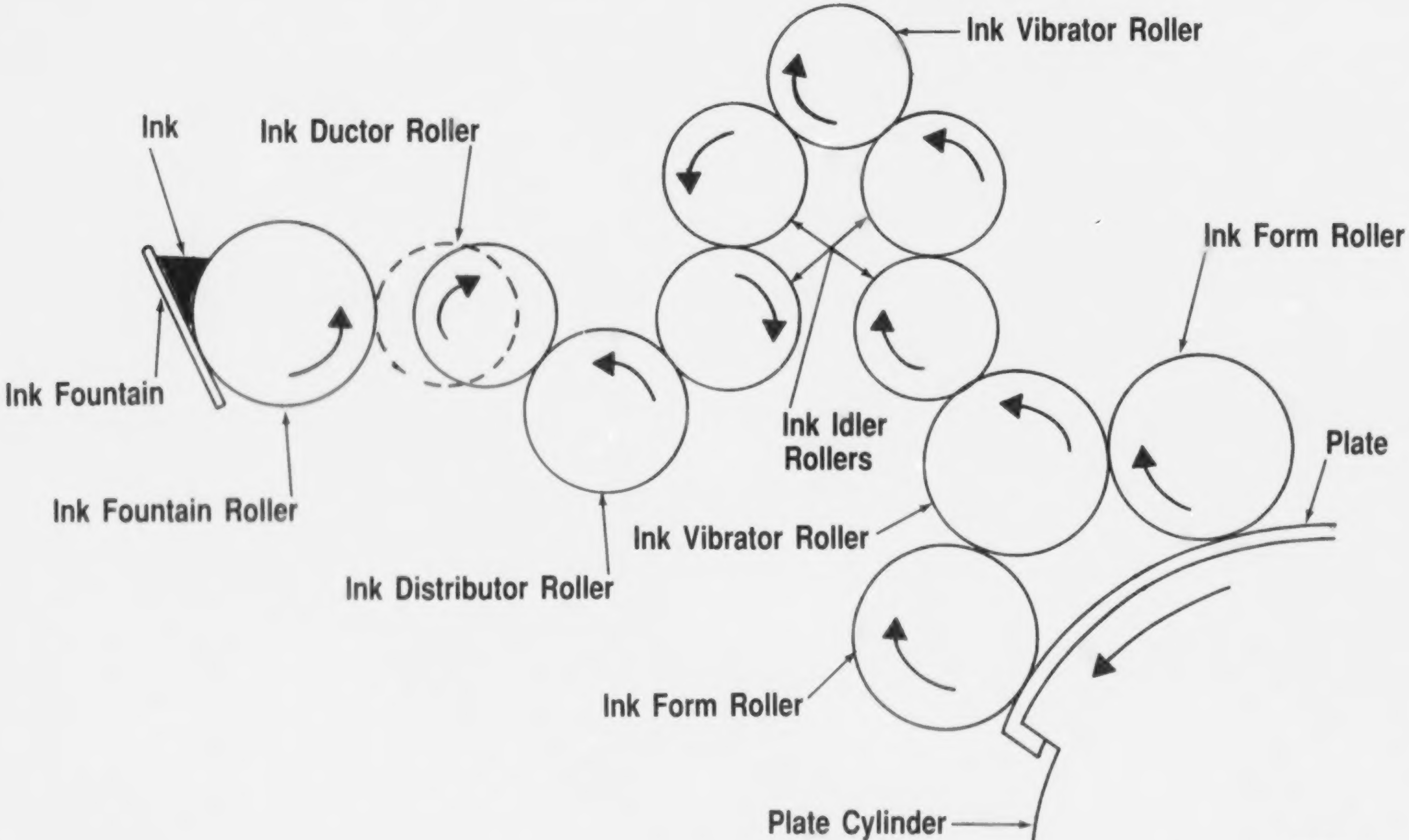


Two-Color
Common Impression
Cylinder

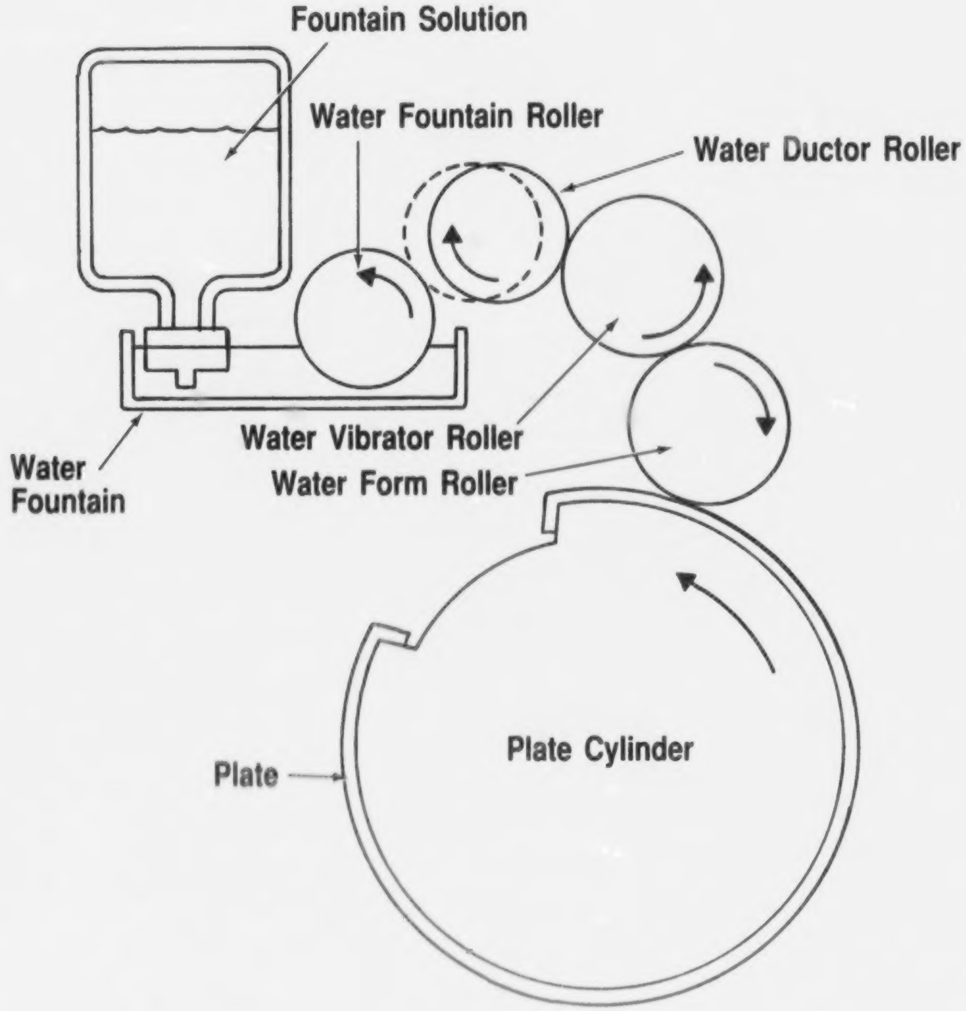


Two-Color
Common Blanket
Cylinder

Components of the Inking System



Components of the Dampening System



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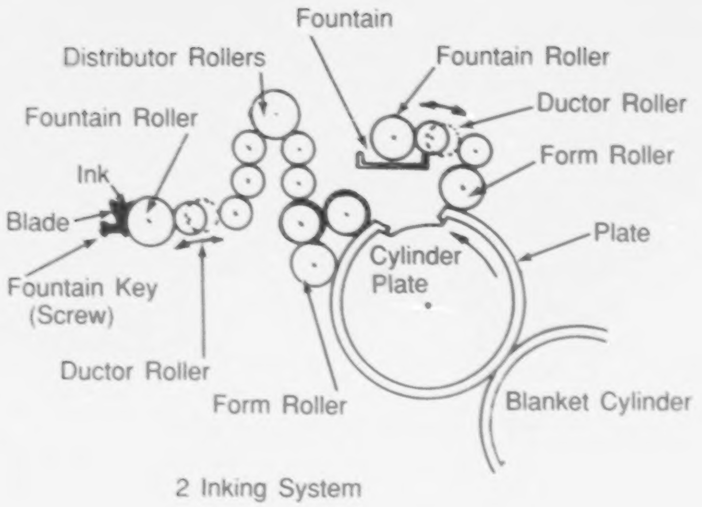
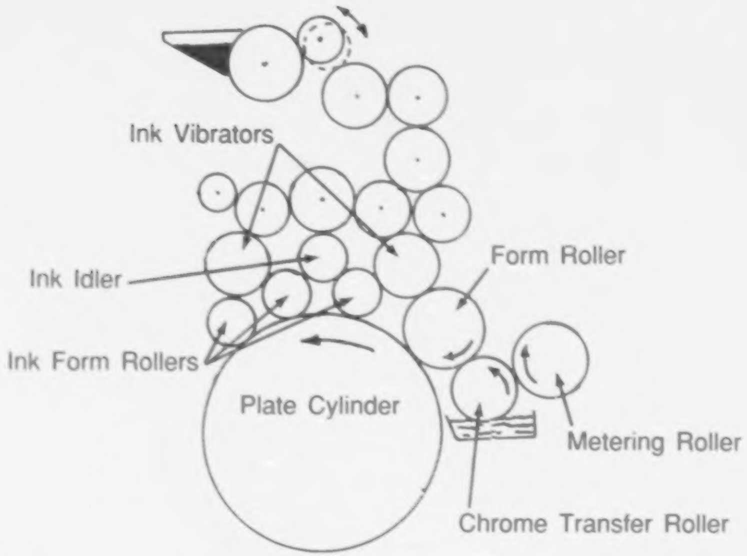
Types of Dampening Systems

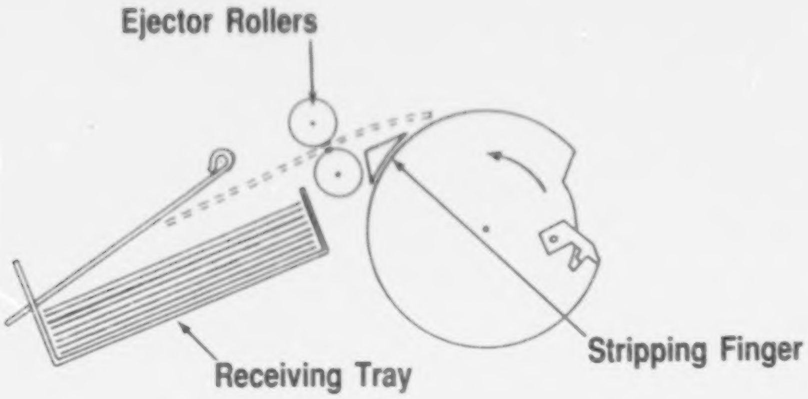


Conventional Inking and Dampening System

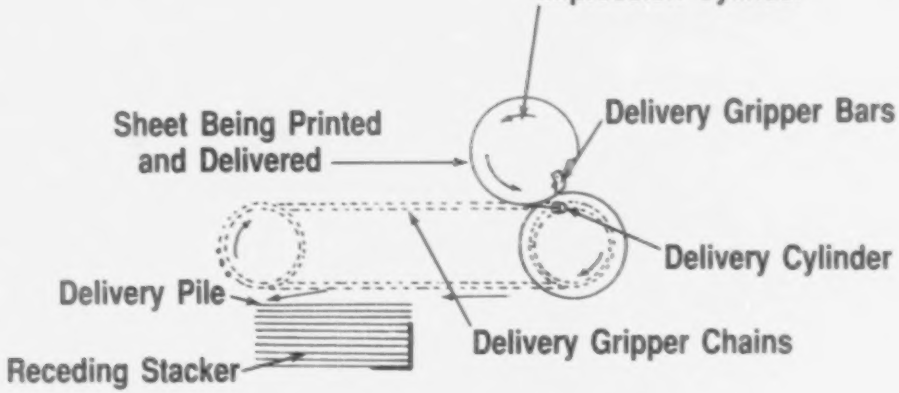


Integrated System

Components of the Delivery System



Tray Delivery



Chain Delivery with Receding Stacker

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to teaching this unit.)

B. Make transparency from the transparency master included with this unit.

C. Discuss objective sheet, unit objectives, and specific objectives.

D. Discuss information and assignment sheets. Assign assignment sheet projects.

(NOTE: Use the transparency to enhance the information as needed.)

E. Discuss and demonstrate the procedures outlined in the job sheets. Assign job sheet projects. Evaluate student performance according to criteria on job sheet.

F. Integrate the following activities throughout the teaching of this unit:

1. Discuss the Pantone Matching System and provide students with a color formula guide.

   (NOTE: If mixing colors of inks is to be included in the curriculum, it is recommended that a PMS mixing kit be acquired from an ink manufacturer and that manufacturer's instructions be followed.)

2. Demonstrate effects of coated and uncoated papers with a given ink.

3. Invite press and ink manufacturers' representatives to demonstrate their products.

4. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

G. Give test.

H. Evaluate test.

I. Reteach if necessary.

SUGGESTED ACTIVITIES

REFERENCES USED IN WRITING THIS UNIT

A. Anton, Karl V., Jr. *Handbook of Technical Articles*. Mineola, NY: Van Son Holland Ink Corp. of America.

B. Cogoli, John E. *Photo-Offset Fundamentals*. Old Tappan, NJ: MacMillan Publishing Co., Inc. 1986.

C. Dennis, Ervin A., and John D. Jenkins. *Comprehensive Graphic Arts*. Old Tappan, NJ: MacMillan Publishing Co., Inc., 1983.

D. Lankford, William. *The Offset Press Dampening System*. Pittsburgh, PA: Graphic Arts Technical Foundation, 1980.

E. *Press Operator's Guide*. St. Paul, MN: 3M Company, 1989.

F. Spence, William D. and David G. Vequist. *Graphic Reproduction*. Westerville, OH: Glencoe McGraw-Hill, 1980.

G. *The Lithographers Manual*. Ninth Edition. Ed. Thomas M. Destree. Pittsburgh, PA: Graphic Arts Technical Foundation, 1994.

SUGGESTED SUPPLEMENTAL RESOURCES

A. *A Guide to Pressroom Chemistry*. Orange Park, FL: International Paper Imaging Products Division, 1993. 1(800)354-2300.

B. *Traditional Offset Printing* (77-9803-3198-5). St. Paul, MN: 3M Company, 1989.

C. 3M Products for Electronic Color Printing (77-9803-3199-3). St. Paul, MN, 1989.

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

The student should submit a complete list of all inks and additives in the storage area of the school shop. The list should contain brand names by color, and additives with their uses.

Assignment Sheet #2

The student should submit a complete list of chemicals used to prepare fountain solution for all presses in the shop, including chemical, purpose and mixing ratios.

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

TEST

Name ______________________________ **Score** ______________

1. Match the terms on the right with their correct definitions.

_____a. The resistance of ink to flow

_____b. The stickiness of the ink

_____c. The ability of ink to flow and form long or short filaments

_____d. The hiding or covering quality of ink

_____e. The characteristic of an ink that allows images beneath it to show through

_____f. A property of nonfading regardless of exposure to strong light or passage of time

_____g. A tendency to lose color or fade when exposed to sunlight for long periods

_____h. Manufactured to withstand the action of such factors as gases, chemicals, heat, and moisture

_____i. Ink body colors which are not particularly strong

_____j. Strong ink body colors with highly concentrated pigments

_____k. Inks containing finely ground metallic powders, such as aluminum and bronze, which are used to provide silver and gold colors

_____l. Colors which product flat effects

_____m. Natural organic substance from plants which is not soluble in water

_____n. A symbol for the strength of acid or alkali in any solution, represented on a scale from 0-14 with 7 as neutral, 0 as acid, and 14 as alkaline

_____o. The amount of water vapor in the air compared to the greatest amount possible at the same temperature

1. Fugitive
2. Lakes
3. Metallic inks
4. Resin
5. pH
6. Tack
7. Transparency
8. Relative humidity
9. Resistant
10. Opacity
11. Viscosity
12. Toners
13. Length
14. Water colors
15. Permanence
16. Drier
17. Varnish
18. Extender
19. Translucence
20. PMS
21. Draw-down
22. Vehicle
23. Pigments

TEST

_____p. A colorless substance mixed with ink to increase its covering power

_____q. Any substance added to ink to speed drying

_____r. A thin, protective coating which is printed like ink on the paper stock; also used as an additive to vary ink properties

_____s. The varying quality of an ink between opacity and transparency

_____t. A standardized matching system for mixing inks

_____u. The coloring materials in ink

_____v. The bulk of the body of an ink

_____w. A test procedure for comparing two or more inks for color strength, opacity and general appearance

2. Select true statements concerning the main ingredients of offset inks by placing an "X" by the true statements.

_____a. Synthetic oils are types of vehicles which form the body bulk of the ink.

_____b. White pigments are primarily carbon produced by burning petroleum products.

_____c. Colored pigments are mostly synthetic produced by processing chemicals to make dyes.

_____d. Thin oils and solvents reduce tack.

_____e. Some types of modifiers are driers, waxes, and gums.

3. Name three ink manufacturing procedures that benefit the user.

a. ______________________________

b. ______________________________

c. ______________________________

TEST

4. Match the types of ink on the right to their descriptions by placing the numbers in the appropriate blanks.

_____a. Used on high speed presses with heating devices

_____b. Dry by penetration and oxidation

_____c. Exhibit minimum penetration into paper surface

_____d. Dry by absorption on high speed presses

_____e. Contain metal powders suspended in a vehicle

_____f. Contain iron-bearing pigments that can be magnetized

_____g. Have special colors, transparency, and drying characteristics

_____h. Dry quickly on most stock, but dry slowly on ink rollers

1. Quick-set inks
2. News inks
3. Metallic inks
4. Magnetic inks
5. Heat-set inks
6. Gloss inks
7. Rubber base inks
8. Process inks

5. List three conditions influencing the printing performance of offset inks.

a. ______________________________

b. ______________________________

c. ______________________________

6. Name three ink properties which affect the printing quality of offset inks.

a. ______________________________

b. ______________________________

c. ______________________________

7. Select rules for ink care and storage by placing an "X" in the appropriate blanks.

_____a. Keep covers on all containers when not in use.

_____b. Reuse ink after it has been removed from the ink fountain.

_____c. Store inks in open metal cabinet in very cool room.

_____d. Keep ink surface level when removing ink from can.

TEST

8. State the purpose of offset dampening solutions. ______________________________

____

9. Match the dampening solution ingredients on the right with their functions.

______a. The main ingredient which provides the moisture to keep the nonimage areas clean

______b. The main desensitizing agent in the fountain solution; absorbed to the nonimage areas where it replaces the water-holding desensitized film worn off the plate during the press run

______c. Improves the adherence of the gum to the nonimage area of the plate

______d. Keep the acid in the fountain solution from reacting chemically with the metal of the plate and prevent stripping of the metal ink rollers

______e. Stabilize the pH of a fountain solution

______f. Fountain solution chemicals premixed and packaged by manufacturers for specific presses

1. Chemical salts
2. Acid
3. Water
4. Buffers
5. Gum
6. Premixed solutions

10. Name the two methods of measuring pH.

a. ____

b. ____

11. State the generally acceptable pH range for a fountain solution.

____

____

12. Select effects of using alcohol or alcohol substitutes in a fountain solution by placing an "X" in the appropriate blanks.

______a. Increases droplet formation in ink

______b. Less dimensional change in sheet

______c. Ink drying usually faster

______d. Balanced ink-water running condition achieved more slowly

______e. More solution on plate

TEST

13. Discuss the importance of ink-water balance by listing three points related to the topic.

    a. ______________________________

    b. ______________________________

    c. ______________________________

*Permission to duplicate this test is granted.

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

ANSWERS TO TEST

1.

a.	11	g.	1	m.	4	s.	19
b.	6	h.	9	n.	5	t.	20
c.	13	i.	2	o.	8	u.	23
d.	10	j.	12	p.	18	v.	22
e.	7	k.	3	q.	16	w.	21
f.	15	l.	14	r.	17		

2. a, c, d, e

3. a. Ink is mixed by batches and carefully weighed.
   b. Ink is tested at the factory under actual printing conditions.
   c. Packaging varies for convenient use and storage.

4.

a.	5	d.	2	g.	8
b.	1	e.	3	h.	7
c.	6	f.	4		

5. a. Type of press being used
   b. Speed of press
   c. Stock surface being printed

6. a. Color
   b. Body
   c. Ability to dry

7. a, d

8. The purpose of offset dampening solutions—To keep the nonimage area of a well-processed offset plate clean

9.

a.	3
b.	5
c.	2
d.	1
e.	4
f.	6

10. a. pH paper test strips
    b. Electronic pH meter

ANSWERS TO TEST

11. Depends on the ink and paper being used; generally, a solution with a pH between 4.0 and 5.0 is satisfactory

12. b, c

13. Any three of the following:

    a. Key to quality printing
    b. The basic rule for proper adjustment of ink-water balance is to run the minimum amount of ink which will give full color to the job and the minimum amount of water to keep plate clean
    c. Should be controlled to meet the needs of the plate
    d. Proper control demands accurate analysis of problems as they occur
    e. Excessive water causes problems
    f. Insufficient water causes problems

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

UNIT EVALUATION FORM

Student Name ______________________________ Unit Rating ________

Assignment Sheet Ratings

Assignment Sheet #1—Conduct an Ink Cabinet Inventory Rating ______

Comments: ____

____

Assignment Sheet #2—Conduct an Inventory of Offset Press Dampening Chemistry Rating ______

Comments: ____

____

Job Sheet Ratings

Job Sheet #1—Mix Dampening Solution and Test for pH Rating ______

Comments: ____

____

Job Sheet #2—Mix PMS Colors and Conduct and Evaluate an Ink Draw-Down or Smear Rating ______

Comments: ____

____

Job Sheet #3—Mix Two Colors of Ink to Produce a Third Color Rating ______

Comments: ____

____

UNIT EVALUATION FORM

Written-Test Scores

Pretest _____ Posttest____ Other _____

Other

____

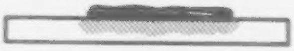
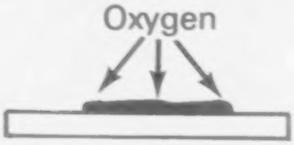
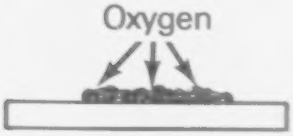
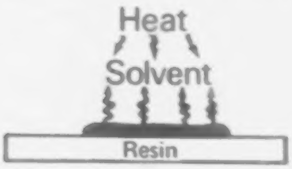
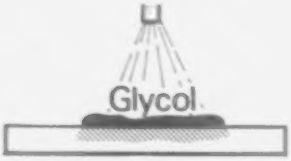
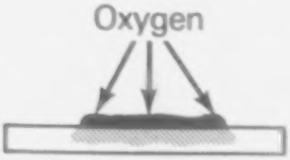
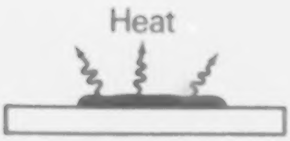
____

Teacher Signature ________________________________ Date ____________

Student Signature ________________________________ Date ____________

*Permission to duplicate this form is granted.

Methods of Ink Drying

	**Absorption**	Nondrying oils penetrate the paper and dry as they are absorbed.
	**Oxidation**	The vehicle absorbs oxygen from the air and becomes solid.
	**Polymerization**	Oxygen sets up a reaction that turns small molecules into a gel, then into large molecules that harden.
	**Resin-Solvent**	The combination resin-solvent vehicle releases the solvent causing the resin to dry; process can be speeded by heating.
	**Moisture-Set**	A glycol-resin vehicle is sprayed with water or steam; glycol mixes with water and is absorbed by the paper and the resin precipitates as a solid film.
	**Resin-Oil**	A combination of absorption and oxidation provides quick setting.
	**Coldset**	A wax and resin vehicle is heated, then becomes solid as heat is radiated away from the vehicle as it cools.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to teaching this unit.)

B. Make transparency from the transparency master included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives with class.

E. Provide students with information and assignment sheets.

F. Discuss information and assignment sheets.

(NOTE: Use the transparency to enhance the information as needed.)

G. Provide students with job sheets.

H. Discuss and demonstrate the procedures outlined in the job sheets. Evaluate student performance according to criteria on job sheets.

I. Integrate the following activities throughout the teaching of this unit:

1. Invite a representative from a printing firm or press manufacturing company to discuss features of various presses.

2. Obtain manuals for several different presses and compare operating controls with the class.

3. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

J. Give test.

K. Evaluate test.

L. Reteach if necessary.

SUGGESTED ACTIVITIES

RESOURCES USED IN DEVELOPING THIS UNIT

A. *ATF Chief 15-17 Operator's Manual.* Whittensville, MA: American Type Founders.

B. *Graphics Master 6.* Kihei, HI: Dean LemAssociates, Inc., 1996.

C. *Models 350 and 360 Offset Duplicators Operating Instructions.* Rochester, NY: Itek GraFix Corp., 1987.

D. *Operation Manual.* Heidelberg Offset, Heidelberg, West Germany: Heidelberger Druckmaschinen Aktiengesellschaft.

E. *Operation Manual 3985.* Rochester, NY: Itek Grafix Corp., 1987.

F. *Operation Manual 975/CPD.* Rochester, NY: Itek Grafix Corp., 1987.

G. *1250 Offset Operator Manual.* Mt. Prospect, IL: AM International, Inc.

H. *1650 Series Operator Manual.* Mt. Prospect, IL: AM International, Inc.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

ANSWERS TO ASSIGNMENT SHEET

Assignment Sheet #1

The student should compare control features on various presses, either in the shop or illustrated, and submit a list of control features common to all presses they compared, as well as a list of unique control features found on each of the presses.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

TEST

Name ______________________________ Score ____________________

1. Match the terms related to offset press operating procedures on the right with their correct definitions.

_____a. Movable metal plates which attach at right angles to the feed table surface to extend its height and allow open space to accommodate the side and back paper guides when the feed table is at top position

_____b. A wheel on the operator's side of a press which allows the operator to turn the press through its cycle by hand

_____c. A thin, narrow, long metal strip attached to the delivery system which aids in controlling the delivery of a sheet to the receiving tray

_____d. A position of slight separation of the rollers in the ink and dampening systems used when the press is not operated for a period of time to prevent flat stripes from forming on roller surfaces

_____e. A condition caused by wet ink from the image on the surface of one sheet rubbing off onto the next sheet in contact with the image

_____f. A petroleum base solvent prepared for washing rubber offset blankets and rollers; used for general press clean up

_____g. A solution that conditions the nonimage area of an offset plate to make it more water receptive

1. Paper bail
2. Night latch
3. Feed table extensions
4. Handwheel
5. Blanket wash
6. Setoff
7. Etch

2. Select true statements concerning essential safety precautions by placing an "X" in the appropriate blanks.

_____a. Tie back long hair.

_____b. Avoid or bind up loose clothing.

TEST

_____c. Remove jewelry such as bracelets, watches, rings and necklaces before operating a press.

_____d. Keep dust cover and safety guards in place for operation.

_____e. Stop the press when using tools for adjustments, making hand adjustments on moving parts, wiping or cleaning with a rag, lubricating any part, clearing paper jams, or leaving press area.

_____f. Limit use of press to one designated operator at any one time.

_____g. Receive specific permission or assignment before press is operated.

_____h. Wad rags for cleaning rather than folding in hand.

_____i. Place dirty rags in a cardboard trash box.

_____j. Read operator's manual while press is running.

_____k. Keep press work area free of trash and clutter.

_____l. Inspect and turn press with the handwheel at least one revolution before starting drive motor.

_____m. Make sure electrical connections are in full contact and free of frayed or broken insulation.

_____n. Ventilate fumes from the press area.

_____o. Store flammable liquids wherever there is room for them.

3. List two reasons why efficient press operation is important.

a. ____

____

b. ____

____

4. Select offset press operator control functions by placing an "X" in the appropriate blanks.

_____a. Control ink to plate image area

_____b. Control dampening solution to plate image area

_____c. Complete job order records for press operation

_____d. Control press wash-up

_____e. Maintain safe and orderly work area

TEST

5. Match typical operator control features with the press systems in which they are located by placing the number of the system on the right in front of the appropriate features.

(NOTE: Answers will be used more than once.)

_____a. Feed roller timing
_____b. Paper delivery guides
_____c. Double sheet detector
_____d. Vertical image position
_____e. Ink form roller on/off control
_____f. Water form roller on/off control
_____g. Feed table raise/lower crank
_____h. Sheet control wheels
_____i. Ejector unit for tray and receding stacker
_____j. Handwheel
_____k. Fountain solution
_____l. Ink fountain adjusting screws
_____m. Water feed control lever
_____n. Paper turning wheels for chain delivery
_____o. Paper feed guides
_____p. Sheet hold down strips
_____q. Stack height regulator
_____r. Plate position
_____s. Pull-out roller pressure
_____t. Side register guides
_____u. Stacker raise/lower crank
_____v. Vacuum control
_____w. Ink feed lever

1. Feeder system
2. Register system
3. Delivery system
4. Cylinder system
5. Inking system
6. Dampening system

TEST

_____x. Blanket to impression cylinder pressure

_____y. Paper stops

_____z. Sheet separators

_____aa. Stacker lowering speed control

_____bb. Feed roller pressure

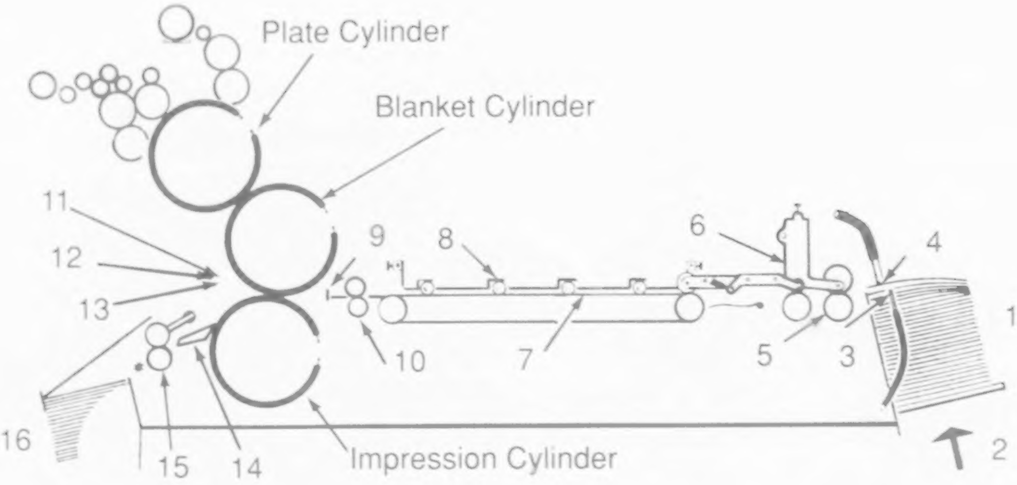
_____cc. Plate to blanket pressure

_____dd. Air blast (blower) control

_____ee. Water ductor roller on/off control

_____ff. Ink ductor roller on/off control

6. Arrange in order steps in the sequence of paper movement through a typical offset press by writing a "1" for the first step, a "2" for the second step, and so on, using the diagram as a guide.



_____a. Pullout rollers move sheet to register board.

_____b. Cylinder grippers grip sheet and guide it between impression and blanket cylinders.

_____c. Receiving tray or table holds finished sheets.

_____d. Paper is placed on feed table.

TEST

_____e. Several moving tapes carry paper along register board.

_____f. Strippers separate the paper from the impression cylinder.

_____g. Stop fingers move up and down to halt sheet for register to side position and for timing of feed into cylinder grippers.

_____h. Sucker tube lifts paper, moving it to pullout rollers.

_____i. After holding the sheet for less than one revolution, the cylinder grippers open.

_____j. Feed table raises automatically.

_____k. Image transfers to paper from blanket by pressure from the impression cylinder.

_____l. Ejector wheels guide the paper into receiving tray or stacker.

_____m. Sheet separators and air blowers separate sheets.

_____n. Balls and metal strips hold paper down on tapes.

_____o. Feed rollers move sheet into cylinder grippers.

_____p. Double sheet detector prevents more than one sheet from going to register system at a time.

*Permission to duplicate this test is granted.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

ANSWERS TO TEST

1. a. 3
b. 4
c. 1
d. 2
e. 6
f. 5
g. 7

2. a, b, c, d, e, f, g, k, l, m, n

3. a. No income is received unless printed sheets are delivered from the press.
b. Reduced profit potential results from inefficient use of time, equipment, and materials.

4. a, c, d, e

5. a. 2
b. 3
c. 1
d. 4
e. 5
f. 6
g. 1
h. 2
i. 3
j. 4
k. 6
l. 5
m. 6
n. 3
o. 1
p. 2
q. 1
r. 4
s. 1
t. 2
u. 3
v. 1
w. 5
x. 4
y. 2
z. 1
aa. 3
bb. 2
cc. 4
dd. 1
ee. 6
ff. 5

6. a. 5
b. 11
c. 16
d. 1
e. 7
f. 14
g. 9
h. 4
i. 13
j. 2
k. 12
l. 15
m. 3
n. 8
o. 10
p. 6

OFFSET PRESS OPERATING PROCEDURES
UNIT III

UNIT EVALUATION FORM

Student Name ______________________ Unit Rating ________

Assignment Sheet Rating

Assignment Sheet #1—Compare Control Features of Offset Presses Rating _____

Comments: ______________________________________

____

Job Sheet Ratings

Job Sheet #1—Set Up the Sheet Control Systems Rating _____

Comments: ______________________________________

____

Job Sheet #2—Set Up the Image Control Systems Rating _____

Comments: ______________________________________

____

Job Sheet #3—Operate an Offset Press From Set Up of System Through Printed Sheet Delivery Rating _____

Comments: ______________________________________

____

Job Sheet #4—Perform a Color Wash on an Offset Press Rating _____

Comments: ______________________________________

____

Job Sheet #5—Print Envelopes Rating _____

Comments: ______________________________________

____

UNIT EVALUATION FORM

Job Sheet #6—Change Press From Envelopes to Letterhead Rating _____

Comments: ____________________

Job Sheet #7—Print a Two-Color Job Rating _____

Comments: ____________________

Job Sheet #8—Print a Work-And-Turn Rating _____

Comments: ____________________

Job Sheet #9—Print Halftones & Screen Tints Rating_____

Comments: ____________________

Job Sheet #10—Print Solids Rating _____

Comments: ____________________

Job Sheet #11—Perform Perforation and Scoring Rating _____

Comments: ____________________

Written-Test Scores

Pretest _____ Posttest____ Other _____

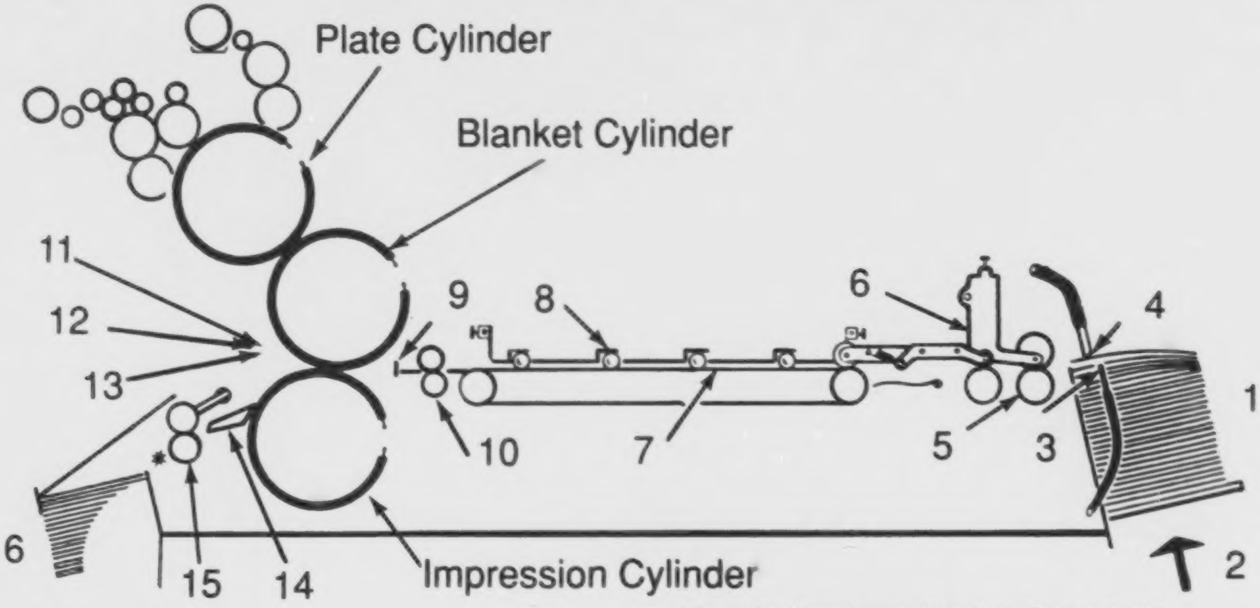
Other ____________________

Teacher Signature ____________________ Date __________

Student Signature ____________________ Date __________

*Permission to duplicate this form is granted.

Sequence of Paper Movement Through a Typical Offset Press



1. Paper is placed on feed table.
2. Feed table raises automatically.
3. Sheet separators and air blowers separate sheets.
4. Sucker tube lifts paper, moving it to pull out rollers.
5. Pull out rollers move sheet to register board.
6. Double sheet detector prevents more than one sheet from going to register system at a time.
7. Several moving tapes carry paper along register board.
8. Balls and metal straps hold paper down on tapes.
9. Stop fingers move up and down to halt sheet for register to side position and for timing of feed into cylinder grippers.
10. Feed rollers move sheet in to cylinder grippers.
11. Cylinder grippers grip sheet and guide it between impression and blanket cylinders.
12. Image transfers to paper from blanket by pressure from the impression cylinder.
13. After holding the sheet for less than one revolution the cylinder grippers open.
14. Strippers separate the paper from the impression cylinder. (NOTE: on chain delivery systems the paper is transferred from cylinder grippers to chain grippers at this point.)
15. Ejector wheels guide the paper into receiving tray or stacker.
16. Receiving tray or table (jogger) holds finished sheets.

TM 1

GIII-T73

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to teaching this unit.)

B. Make transparencies from the transparency masters included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information sheets, assignment sheets, and student supplements.

F. Discuss information and assignment sheets.

(NOTE: Use the transparencies to enhance the information as needed.)

G. Provide students with job sheets.

H. Discuss and demonstrate the procedures outlined in the job sheets. Evaluate student performance according to criteria on job sheets.

I. Integrate the following activities throughout the teaching of this unit:

   1. Invite resource people to demonstrate troubleshooting procedures and adjustments on various pieces of equipment.

   2. Emphasize care in handling any cleaning solvents and chemicals.

   3. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

J. Give test.

K. Evaluate test.

L. Reteach if necessary.

RESOURCES USED IN DEVELOPING THIS UNIT

A. Anton, Karl V., Jr. *Handbook of Technical Articles.* Mineola, NY: Van Son Holland Ink Corporation of America.

B. *ATF Chief Operating Instructions.* Whittensville, MA: American Type Founders.

SUGGESTED ACTIVITIES

C. Cogoli, John E. *Photo-Offset Fundamentals.* Old Tappan, NJ: MacMillan Publishing Co., Inc. 1986.

D. *Operation Manual.* Heidelberg Offset, Heidelberg, West Germany: Heidelberger Druckmaschinen Aktiengesellschaft.

E. *Operation Manual 3985.* Rochester, NY: Itek Grafix Corp., 1987.

F. *Operation Manual 975/CPD.* Rochester, NY: Itek Grafix Corp., 1987.

G. *Press Operator's Guide.* St. Paul, MN: 3M Company, 1989.

H. Spence, William D. and David G. Vequist. *Graphic Reproduction.* Westerville, OH: Glencoe McGraw-Hill, 1980.

I. *1250 Offset Operator Manual.* Mt. Prospect, IL: AM International, Inc., 1989.

J. *1650 Series Operator Manual.* Mt. Prospect, IL: AM International, Inc., 1987.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

(NOTE: Suggested answers are based on Transparency 3.)

1. Scumming

2. Any six of the following problems and solutions:

Possible Problems	Possible Solutions
Sensitive plate	Desensitize.
Highly bichromated fountain solution	Check solution and re-mix if necessary.
Plate exposed to light after fountain solution allowed to dry on it	Desensitize or re-make plate.
Excessive printing pressure could indirectly cause scum	Check cylinder pressures, adjust as needed.
Paper or ink causing plate sensitivity	Check out paper and ink.
Negative plate improperly desensitized or lightstruck	Desensitize or re-make plate.
Positive plate underexposed; water on plate during developing/fixing; improperly desensitized	Re-make plate.
Ink form roller setting	Check ink form roller setting to the vibrator roller and to the plate. The vibrator roller should drive the ink form roller and not the plate.
Fountain solution too weak or improperly mixed.	Increase strength or remix.
Ink sensitizing plate background beyond image area	Desensitize with plate cleaner-conditioner.
Glazed offset blanket	Clean all gum, spray, paper sizing, etc. from blanket with deglazer and pumice.
Low alcohol content	Bring to correct concentration.

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #2

(NOTE: Suggested answers are based on Transparency 14.)

1. Paper curling

2.

Possible Problems	Possible Solutions
Too much water	Run with minimum water.
Paper not properly conditioned	Condition paper to pressroom conditions.
Room humidity not constant	Install proper controls.
Heavy copy at end of form	Reverse plate if possible.
High ink tack	Reduce tack of ink with reducing varnish.
Excess blanket to impression cylinder pressure	Reduce impression setting.

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #3

(NOTE: Suggested answers are based on Transparency 9.)

1. Weak or open areas in printed image.

2.

Possible Problems	Possible Solutions
Plate worn	Redevelop plate. Make new plate.
Plate to blanket cylinder pressure too light	Increase pressure.
Blanket to impression cylinder pressure too light	Increase pressure.
Damaged blanket	Apply blanket fix to swell area. Remove blanket and roll out damaged area. Change blanket.
Paper particle buildup on blanket	Clean blanket with blanket wash and water miscible cleaner.
Irregular stock surface	Increase blanket to impression cylinder pressure. Change stock.

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #4

Possible Problems	Possible Solutions
Vacuum pump not on	Turn switch on. Repair loose or broken wires. Replace switch.
No vacuum or air blast (pump drive motor on)	Check pump drive belt (replace if broken).
No vacuum or air blast at feeder (pump is on)	Repair or replace broken or leaking hose. Loosen sticking pump vanes (flush with mixture of oil and solvent).
Feeder lever not operative	Replace loose or broken spring. Tighten loose screws.
Paper stack too high or too low	Check feed table release. Set stack height for stock being fed. Correct stack height feelers.
Paper guides too tight	Set guides to touch sheet edges but not bind.
Sucker feet worn	Replace rubber feet.
Sucker tubes open	Close off tubes not in use.

The student should locate the specific problem and offer a written solution.

Assignment Sheet #5

The student should list all daily, weekly/bi-weekly, and monthly lubrication points for the specific press being used.

Assignment Sheet #6

The chart should be set up as in Transparency 1 and contain all information gathered in Assignment Sheet #5 or other items of your choice.

Assignment Sheet #7

The student should give part name and how many there are for the press assigned.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

TEST

Name ______________________________ **Score** ________________

1. Match the terms related to preventive maintenance and troubleshooting on the right with their correct definitions.

_____a. The performance of routine inspection, cleaning, adjusting, lubrication, and minor repairs which aid in preventing major equipment failure and process troubles

_____b. Powdered volcanic rock used for cleaning and scouring surfaces which must be free of oil residue

_____c. A cleaner used to dissolve dried ink, solvent, and gum deposits from the surfaces of press rollers and blanket

_____d. A cleaner used to remove oil and grease residue from the plate and impression cylinder surfaces

_____e. A cleaner that mixes with water to remove water soluble particles from press rollers, blanket, and cylinder

_____f. A thin layer of hardened ink, fountain solution, and blanket wash which forms on press rollers and blanket

_____g. A thin layer of tiny particles of clay, sizing, lint, and other paper components that forms on the press rollers and blanket

_____h. A powder used to protect the surface of a rubber offset blanket during storage and to aid in maintaining the blanket's resilience

_____i. A rubber ink roller that will not hold ink on its surface because of fountain solution, etch, and other chemicals dried in the pores

1. Piling
2. Troubleshooting
3. Ink glaze
4. Sensitized roller
5. Pumice powder
6. Toning
7. Emulsification
8. Deglazer
9. Misting
10. Preventive maintenance
11. Degreaser
12. Trapping
13. Water miscible cleaner
14. Picking
15. Blanket powder
16. Set-off
17. Scumming
18. Tinting
19. Chalking
20. Paper glaze

TEST

_____j. The process of analyzing problems to determine probable causes and applying possible solutions until a problem is solved

_____k. A mixing of ink and fountain solution affecting the separation of image and nonimage areas of the offset plate

_____l. Ink transferred from the front surface of one sheet to the back surface of the sheet above in the delivery pile

_____m. Ink on the paper turning dry and powdery

_____n. Ability of ink to print over a previously applied ink

_____o. Emulsified ink suspended in the fountain solution on the plate surface appearing as a uniform tint on the printed sheet

_____p. Plate picking up ink in the clear areas and transferring to the clear area of the sheet

_____q. Ink building up on rollers, plate, and/or blanket

_____r. Ink tearing away part of the paper coating as the sheet is printed; this appears as black spots in the blank areas of the printed sheet and white spots in the solid areas

_____s. Ink flying into atmosphere as fine mist, especially at high temperature and speed

_____t. Ink adhering to nonimage area of plate and transferring to printed sheet because of lack of dampening

TEST

2. List seven advantages of a routine, thorough preventive maintenance program.

   a. ______________________________

   b. ______________________________

   c. ______________________________

   d. ______________________________

   e. ______________________________

   f. ______________________________

   g. ______________________________

3. Name the three areas of work in a preventive maintenance program.

   a. ______________________________

   b. ______________________________

   c. ______________________________

4. Match the preventive maintenance schedules on the right with their descriptions.

   _____a. The regular cleaning that takes place after a day's run; the most important of the preventive maintenance schedules

   _____b. Usually takes place at the end of the work week; designed for blanket rotation or protection of other press elements while the press is not in use.

   _____c. Supplements daily and weekly cleaning and includes a complete cleaning of the total press from the top to the floor

   1. Weekly
   2. Monthly
   3. Daily

5. Select true statements concerning requirements for a preventive maintenance schedule in chart form by placing an "X" in the appropriate blanks.

   _____a. A preventive maintenance chart should include the three categories of work: cleaning, lubricating, and adjusting.

   _____b. Each category should have columns for listing the time when work should be done: daily, weekly/bi-weekly, or monthly.

   _____c. Each maintenance activity on the chart should have a block for marking the date when maintenance was performed.

TEST

_____d. The operator's manual and other manufacturer's guides should be referenced for lubrication and adjustments.

_____e. The back side of the PM chart should provide space to log the date problems occur, what the problems are, and how the problems are solved.

6. Select true statements concerning preventive maintenance procedures for daily cleanup by placing an "X" in the appropriate blanks.

Ink system

_____a. Use the blanket wash normally used for cleaning the blanket during the press run to clean ink rollers.

_____b. Clean only parts that seem to need cleaning.

Dampening system

_____c. Wipe ink particles from roller cover using a cotton pad dampened with fountain solution.

_____d. Remove covered rollers from press and loosen ink with blanket wash, then flush blanket wash from cover with running water.

_____e. Remove excess moisture from cover by rolling the roller with open palms on top of used rags on a flat surface.

_____f. Clean metal dampening rollers with plate cleaner or a water miscible cleaner or pumice powder and water to remove all ink, oil, or residue that repels water.

_____g. A coating of blanket wash may be applied to metal rollers after cleaning.

_____h. Change dampening roller cover if enough ink has been trapped on the surface to form an ink glaze that appears shiny.

Cylinders

_____i. Use plate cleaner or nonabrasive water miscible cleaner on plate cylinder, then coat with plate etch.

_____j. Thoroughly clean blanket with blanket wash and water, then clean blanket cylinder ends and dry blanket.

_____k. Wipe ink from surface of impression cylinder with plate etch, or remove ink with blanket wash or deglazer, than clean with plate cleaner, degreaser, or water miscible cleaner, then coat with etch.

TEST

Press

_____l. Use a shop towel dampened with water.

_____m. Wipe ink, paper lint, dust, and oil from side covers, side frames, support bars, cam shafts, and gear shafts.

Work station

_____n. Clean work table surface.

_____o. Clean chemical shelf; wipe containers.

_____p. Place dirty shop towels in safety can.

_____q. Place all waste paper somewhere out of the way.

_____r. Arrange work station in orderly manner.

7. List six preventive maintenance procedures for weekly cleanup.

a. ____

b. ____

c. ____

d. ____

e. ____

f. ____

8. List five preventive maintenance procedures for monthly cleanup.

a. ____

b. ____

c. ____

d. ____

e. ____

TEST

9. Select correct procedures for daily, weekly, and monthly lubrication by placing an "X" beside statements that apply.

_____a. Unplug the power supply; never lubricate a press while it is running.

_____b. Use whatever lubricants are available.

_____c. The best time for daily lubrication is at the end of the day's run.

_____d. All friction points of all exposed moving parts should be lubricated weekly.

_____e. Monthly lubrication should follow monthly cleanup before covers are replaced.

10. Complete the following list of daily and weekly adjustment procedures.

a. ______________________________

b. Adjustments should be made as necessary to make-ready for each job order and should be made at will as needed.

c. Weekly adjustments should be those necessary to troubleshoot and solve problems.

11. List three monthly adjustment requirements.

a. ______________________________

b. ______________________________

c. ______________________________

12. Arrange in order the steps in making an ink form roller check by writing a "1" for the first step, a "2" for the second step, and so on.

_____a. Uniform stripes of ink 1/8" to 3/16" wide indicate proper adjustment.

_____b. Irregular ink stripes indicate either uneven settings or worn rollers, and adjustments should be made to correct the problem.

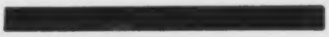
_____c. Ink up the press.

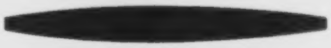
_____d. Gently drop the ink form rollers to the plate, then lift them.

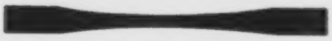
_____e. Turn the handwheel to bring the plate around for inspection.

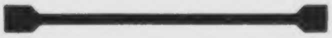
TEST

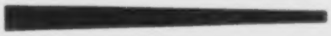
13. Identify the ink stripe configurations illustrated by matching them with the definitions on the right.

_____a. 

_____b. 

_____c. 

_____d. 

_____e. 

1. Setting uneven
2. Ideal setting
3. Roller swollen at ends
4. Low area in center
5. Roller worn at ends

14. Arrange in order the sequence of troubleshooting technique by writing a "1" for the first step, a "2" for the second step, and so on.

_____a. Identify specific symptoms of the problem.

_____b. List the probable causes.

_____c. List possible solutions for each cause.

_____d. Make no assumptions.

_____e. Look for the simple cause and the simple solut

15. List four categories of press troubles.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

TEST

16. Distinguish between the two types of emulsification by placing an "X" beside the statement that reflects what happens when there is excess water in ink.

_____a. Causes ink to pile on rollers, plate and/or blanket producing a grayed image on sheet

_____b. Produces overall tint in background area on the printed sheet

17. Describe the technique for avoiding emulsification.

____

____

18. Select from the following list conditions creating ink drying problems by placing an "X" in the appropriate blanks.

_____a. Relative humidity

_____b. Not enough moisture run on the press

_____c. pH of fountain solution

_____d. Type of printing paper

_____e. pH of printing paper

_____f. Too much oxygen

_____g. Temperature

19. Match common ink problems on the press with their descriptions.

_____a. Ink is transferred from the front surface of one sheet to the back surface of the sheet above in the delivery pile.

_____b. Ink on the paper turns dry and powders.

_____c. Ability of ink to print on previously applied ink is impaired.

_____d. Emulsified ink suspended in the fountain solution on the plate surface appears as a uniform tint on the printed sheet.

_____e. Plate picks up ink in the clear areas and transfers it to the clear areas of the sheet.

1. Piling
2. Misting
3. Scumming
4. Chalking
5. Toning
6. Picking
7. Tinting
8. Set-off
9. Trapping

TEST

_____f. Ink builds up or piles on rollers, plates, and/or blanket.

_____g. Ink tears away parts of the paper coating as the sheet is printed; these appear as black spots in the blank areas of the printed sheet and white spots in the solid areas.

_____h. Ink flies into the atmosphere as fine mist, especially at high temperature and speed.

_____i. Ink adheres to nonimage area of plate because of lack of dampening and transfers to printed sheet.

20. List four guidelines for evaluating good print quality.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

21. Match print quality problems with their causes.

_____a. Background dirty because of too much ink, not enough moisture, dirty dampener roll covers, or dampener covers tied too tightly on ends

_____b. Not enough ink, too much moisture, wrong color of ink, incorrect dampener form roller pressure, incorrect plate-to-blanket pressure, or incorrect impression-to-blanket pressure

_____c. Glazed ink rollers, glazed blanket, too much ink form roller pressure, or too much dampener form roller pressure

_____d. Too much ink, too much impression-to-blanket pressure, not enough plate-to-blanket pressure, or too many revolutions on blanket without paper going through causing buildup on blanket

1. Gray, washed out dirty background
2. Gray, washed out
3. Image breakdown during run
4. Paper curling in receiver
5. Scumming
6. Weak spots
7. Double image
8. Streaking
9. No image at all

TEST

______e. Incorrect ink distribution, glazed rollers, incorrect dampener form roller parallel pressure, poor paper surface, incorrect ink form roller parallel pressure, incorrect plate-to-blanket parallel pressure, incorrect impression-to-blanket parallel pressure, or dirty impression cylinder

______f. Loose blanket, too much ink and fountain solution, not enough plate-to-blanket pressure, loose plate, or incorrect impression-to-blanket pressure

______g. Incorrect plate-to-blanket pressure, incorrect impression-to-blanket pressure, low spots in blanket, tacky ink, tacky blanket, dirty impression cylinder, or blind image on plate caused by dried gum or too strong fountain solution

______h. Too much dampening form roller pressure, too much ink form roller pressure, too much plate-to-blanket pressure, fountain solution too strong, or end play in form rollers

______i. Incorrect ink form roller pressure, incorrect dampener form roller pressure, incorrect plate-to-blanket pressure, incorrect impression-to-blanket pressure, improper ink, or loose blanket

______j. Loose blanket, side guides not set properly, paper not cut straight, or cam band not set

______k. Not enough ink roller form pressure, not enough plate-to-blanket pressure, not enough impression-to-blanket pressure, too much moisture, glazed blanket, or glazed ink rollers

______l. Too much moisture or a curl in the paper

______m. Paper stop fingers too high, feed rollers not set properly, or paper hitting back stop in receiver too hard

10. Copy too dark
11. Paper missing grippers
12. Paper nicking on edge
13. Paper wrinkling
14. Uneven printing
15. Improper register

TEST

_____n. Stop fingers incorrectly set or feed rollers out of adjustment

_____o. Too much moisture, paper damp, too much pressure between blanket and impression cylinder, or register board not set properly

*Permission to duplicate this test is granted.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

ANSWERS TO TEST

1.

a.	10	f.	3	k.	7	p.	17
b.	5	g.	20	l.	16	q.	1
c.	8	h.	15	m.	19	r.	14
d.	11	i.	4	n.	12	s.	9
e.	13	j.	2	o.	18	t.	6

2. Any seven of the following:
   a. Prevents time loss due to press breakdown
   b. Lengthens life of rollers and blanket
   c. Aids in delivering a clean product
   d. Prevents excessive wear on moving parts
   e. Insures longer periods of trouble-free press operation
   f. Increases production
   g. Insures good image transfer
   h. Provides opportunity to locate and correct potential problems on a scheduled basis rather than during a production breakdown
   i. Helps operator to be aware of potential problems
   j. Helps operator to become more familiar with press mechanical functions
   k. Helps operator to identify and correct troubles
   l. Presents an impressive, organized work station for view by the employer, customers, or visitors

3. a. Cleaning equipment and work area
   b. Lubricating equipment
   c. Adjusting operator controllable settings on equipment

4. a. 3
   b. 1
   c. 2

5. a, b, c, d, e

6. a, c, d, f, h, i, j, k, m, n, o, p, r

ANSWERS TO TEST

7. Any six of the following:
    a. Deglaze ink rollers and offset blanket.
    b. Change blanket if rotation plan is followed.
    c. Desensitize noncovered dampening rollers.
    d. Degrease plate and impression cylinder surfaces.
    e. Clean ink ductor cam truck or follower.
    f. Clean plate clamps.
    g. Clean delivery stripping rollers and rings or chain delivery clamps and paper turning wheels.
    h. Wipe oil and dirt off floor area under press.
    i. Clean and/or wash vacuum pump filters according to operator's manual.

8. Any five of the following:
    a. Unplug the power supply.
    b. Remove all safety and dust covers.
    c. Begin at the top of the press and work to the bottom of the press to remove all paper lint and dust from the total press.
    d. Clean oil, ink, paper particles, and dirt from vacuum and drive motors, side frames, cams, gears, levers, shafts, cylinder ends, and all hard-to-reach areas of the press.
    e. Flush press vacuum pump with a mixture of solvent and oil.
    f. Clean vacuum and air blast filters, hoses, and air passages.
    g. Clean upper and lower paper pull-out rollers or forwarding rollers.
    h. Clean upper and lower paper feed rollers.

9. a, d, e

10. a. Student should not make adjustments until approved as an operator by the instructor.

11. Any three of the following:
    a. Make an ink form roller check.
    b. Adjust dampener rollers to plate cylinder.
    c. Adjust ink form rollers to plate cylinder.
    d. Adjust plate cylinder to blanket cylinder.
    e. Adjust blanket cylinder to impression cylinder.

12. a. 4
    b. 5
    c. 1
    d. 2
    e. 3

13. a. 2
    b. 5
    c. 4
    d. 3
    e. 1

ANSWERS TO TEST

14. a. 3
    b. 4
    c. 5
    d. 1
    e. 2

15. a. Operator
    b. Chemistry and ink
    c. Paper stock
    d. Image transfer process
    e. Mechanical

16. a

17. Run the minimum amount of ink to give the job full color and the minimum amount of dampening solution to keep the plate clean.

18. a, c, d, e, g

19. a. 8
    b. 4
    c. 9
    d. 7
    e. 3
    f. 1
    g. 6
    h. 2
    i. 5

20. Any four of the following:
    a. Crisp, dark lines and solids
    b. A clean background
    c. Clean halftones, screens, and reverses
    d. Good registration
    e. Each sheet dried completely

21. a. 5
    b. 2
    c. 1
    d. 10
    e. 14
    f. 7
    g. 6
    h. 3
    i. 8
    j. 15
    k. 9
    l. 4
    m. 12
    n. 11
    o. 13

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

UNIT EVALUATION FORM

Student Name ________________________________ Unit Rating ______

Assignment Sheet Ratings

Assignment Sheet #1—Use a Troubleshooting Guide
to Find the Best Solution to an Ink and Dampening Problem Rating _____

Comments: ____

____

Assignment Sheet #2—Use a Troubleshooting Guide
to Find the Best Solution to a Paper Stock Problem Rating _____

Comments: ____

____

Assignment Sheet #3—Use a Troubleshooting Guide
to Find the Best Solution to a Process Problem Rating _____

Comments: ____

____

Assignment Sheet #4—Use a Troubleshooting Guide
to Find the Best Solution to a Mechanical Problem Rating _____

Comments: ____

____

Assignment Sheet #5—Determine Lubrication Requirements
for a Specific Press Rating _____

Comments: ____

____

UNIT EVALUATION FORM

Assignment Sheet #6—Set Up a Preventive Maintenance Schedule in Chart Form Rating _____

Comments: ____

____

Assignment Sheet #7—Take an Inventory of Spare Parts Rating _____

Comments: ____

____

Job Sheet Ratings

Job Sheet #1—Adjust Dampener Rollers to Plate Cylinder Rating _____

Comments: ____

____

Job Sheet #2—Adjust Ink Form Rollers to Plate Cylinder Rating _____

Comments: ____

____

Job Sheet #3—Adjust Plate Cylinder to Blanket Cylinder Rating _____

Comments: ____

____

Job Sheet #4—Adjust Blanket Cylinder to Impression Cylinder Rating _____

Comments: ____

____

Job Sheet #5—Change a Molleton Cover Rating _____

Comments: ____

____

UNIT EVALUATION FORM

Job Sheet #6—Degrease Plate and Impression Cylinders Rating _____

Comments: ____

____

Job Sheet #7—Deglaze Ink Rollers and Blanket Rating _____

Comments: ____

____

Job Sheet #8—Change Blanket Rating _____

Comments: ____

____

Job Sheet #9—Backflush Vacuum Pump Rating______

Comments: ____

____

Written-Test Scores

Pretest _____ Posttest____ Other _____

Other

____

____

Teacher Signature ____________________________ Date ___________

Student Signature ____________________________ Date ___________

*Permission to duplicate this form is granted.

GIII-T101

Suggested Preventive Maintenance Chart

Preventive Maintenance Schedule

Equipment

Activity	**Daily**	**Weekly/Bi-weekly**	**Monthly**
CLEAN Date Performed M T W T F	Clean ink, oil, lint, and dust from all exposed surfaces of press and work area.	Clean total press including side frame surfaces, work area, and floor under press. Date ☐	Remove press side covers, clean oil, grease, lint, and dust from all surfaces; deglaze rollers and blanket. Date ☐
LUBRICATE Date Performed M T W T F	Oil friction points of fast moving parts. (List points.)	Oil friction points of all exposed moving parts. (List points.) Date ☐	Remove side covers; oil and/or grease all friction points. (List points.) Date ☐
ADJUST Date Performed M T W T F	Make adjustments as required for jobs being printed.	Make adjustments as required to solve problems. Date ☐	Check and adjust as required all operator controllable settings; form roller parallel, form roller pressure, all cylinders parallel, all cylinders pressure. Date ☐

Operator's guide or manufacturer's guide(s) to use for determining proper lubrication and adjustments ____________________

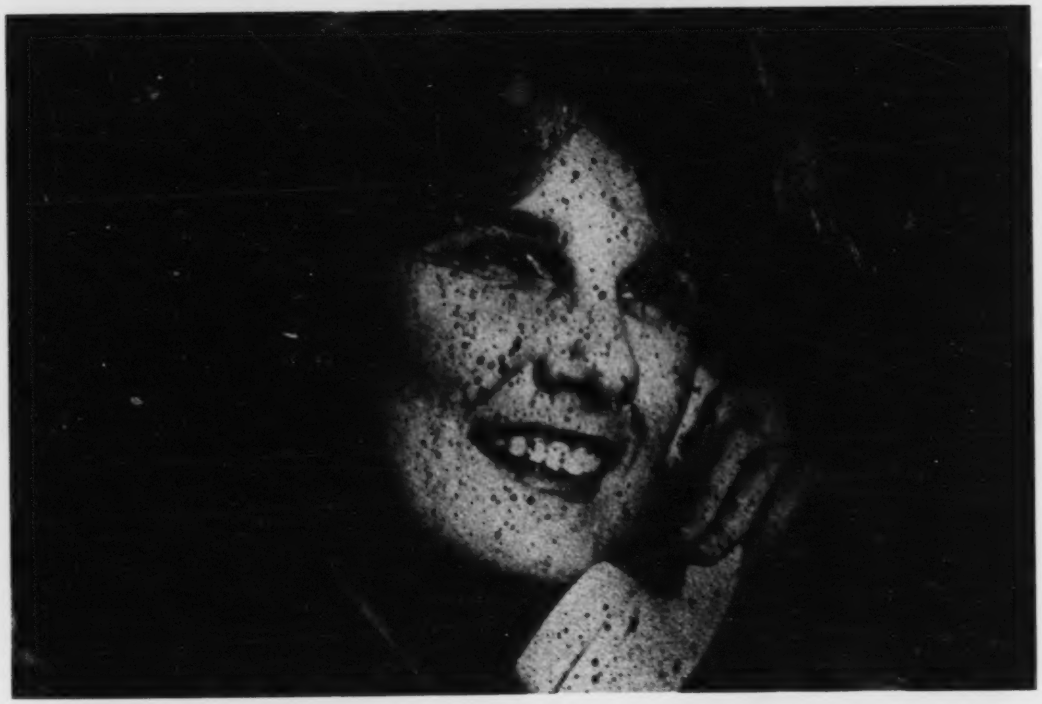
Back Side of Chart

Date	Problem	Solution

Guidelines for Evaluating Good Print Quality

Crisp, dark lines and solids • A clean background • Clean halftones, screens and reverses • Good registration • Each sheet dried completely •

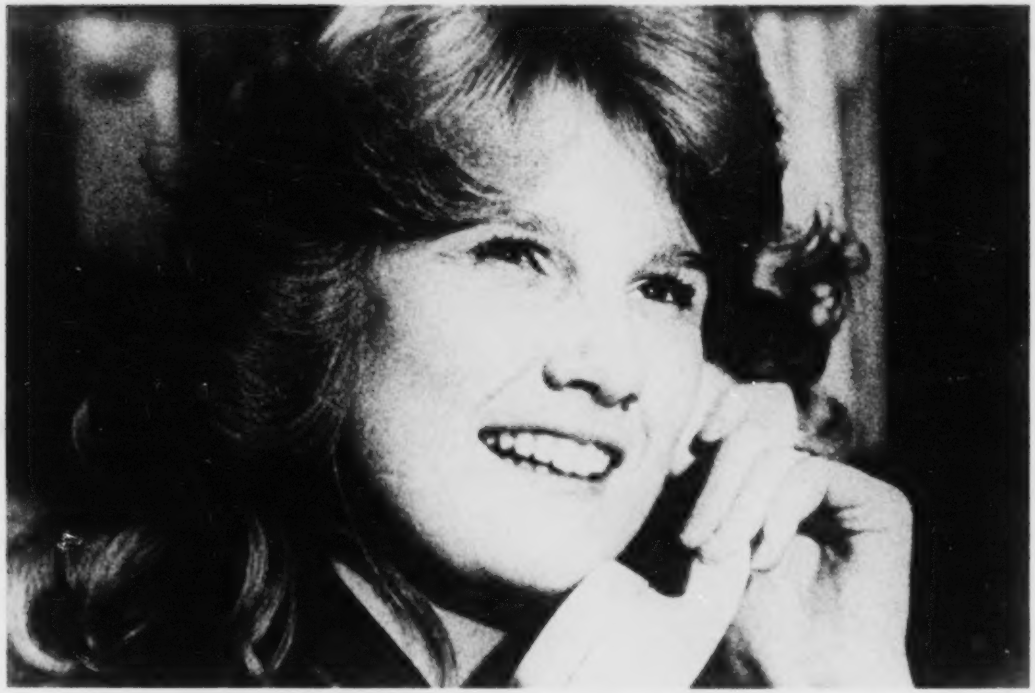
Scumming



Too much ink • Not enough moisture • Dirty dampener roll covers •
Dampener covers tied too tightly on ends •

BEST COPY AVAILABLE

Gray, Washed Out



Not enough ink • Too much moisture • Wrong color of ink • Incorrect dampener form roller pressure • Incorrect plate-to-blanket pressure • Incorrect impression-to-blanket pressure •

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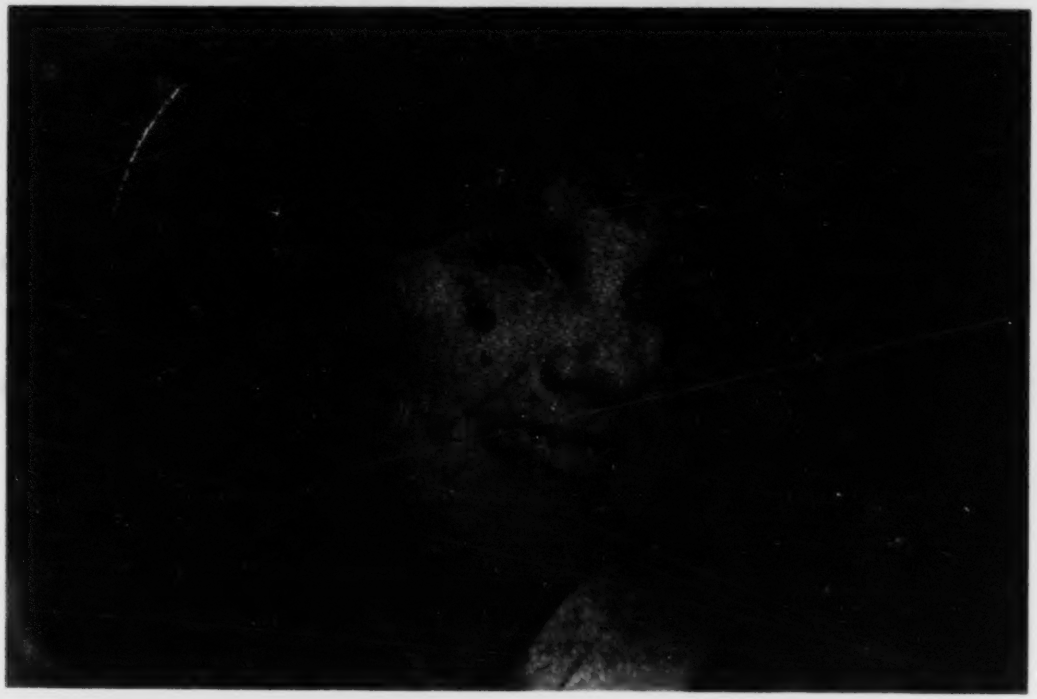
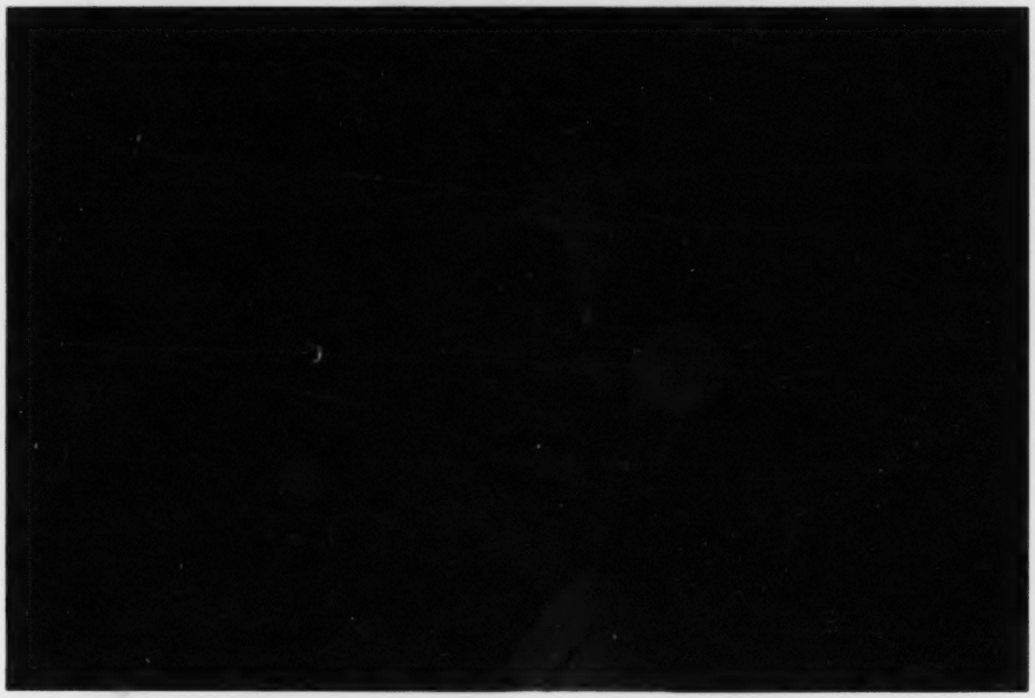
Gray, Washed Out Dirty Background



Glazed ink rollers • Glazed blanket • Too much ink form roller pressure • Too much dampener form roller pressure •

BEST COPY AVAILABLE

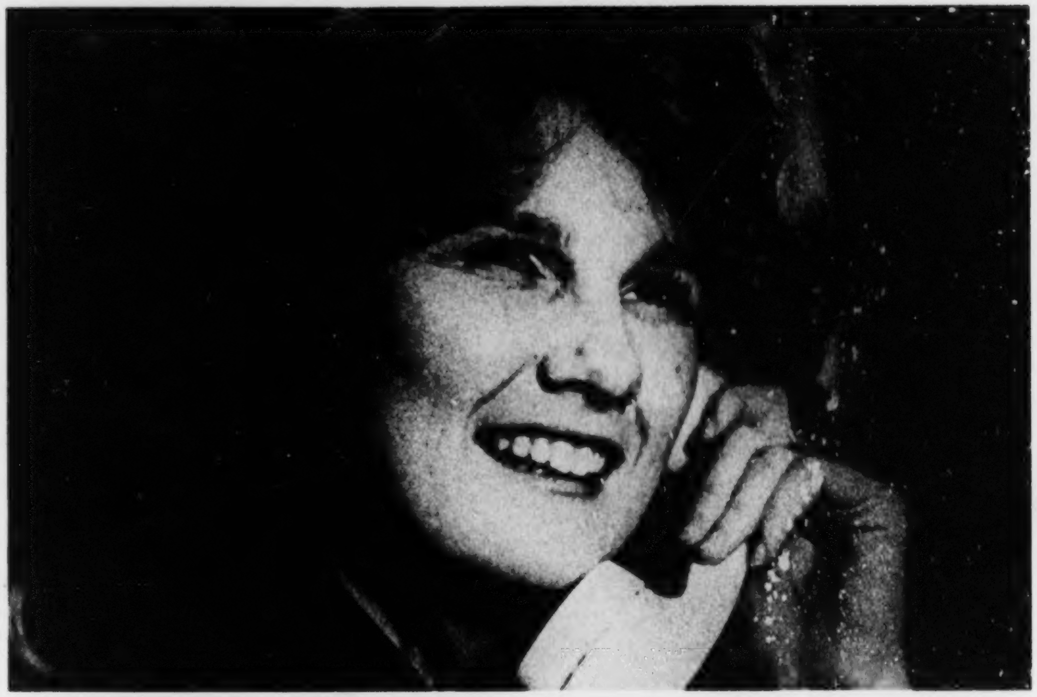
Copy Too Dark



Too much ink • Too much impression-to-blanket pressure • Not enough plate-to-blanket pressure • Too many revolutions on blanket without paper going through (buildup on blanket) •

BEST COPY AVAILABLE

Uneven Printing



Incorrect ink distribution • Glazed rollers • Incorrect dampener form roller parallel pressure • Poor paper (surface of paper) • Incorrect ink form roller parallel pressure • Incorrect plate-to-blanket parallel pressure • Incorrect impression-to-blanket parallel pressure • Dirty impression cylinder •

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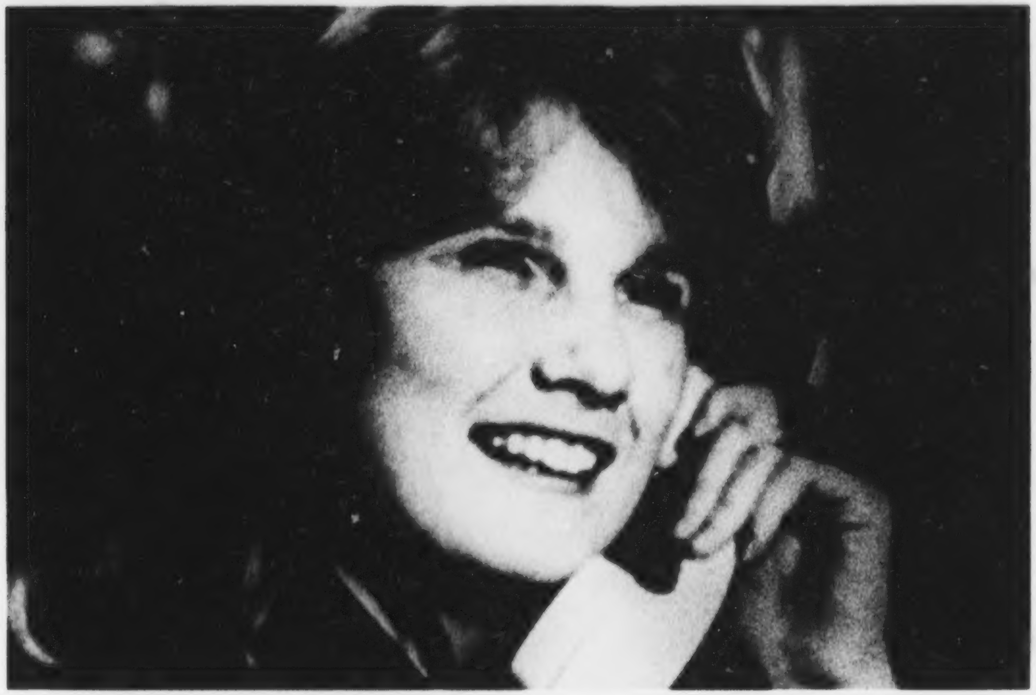
Double Image or Blurred Copy



Loose Blanket • Too much ink and fountain solution • Not enough plate-to-blanket pressure • Loose plate • Incorrect impression-to-blanket pressure •

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Weak Spots or Spotty Copy

Incorrect plate-to-blanket pressure • Incorrect impression-to-blanket pressure • Low spots in blanket • Tacky ink • Tacky blanket • Dirty impression cylinder • "Blind" image on plate caused by dried gum or too strong fountain solution •

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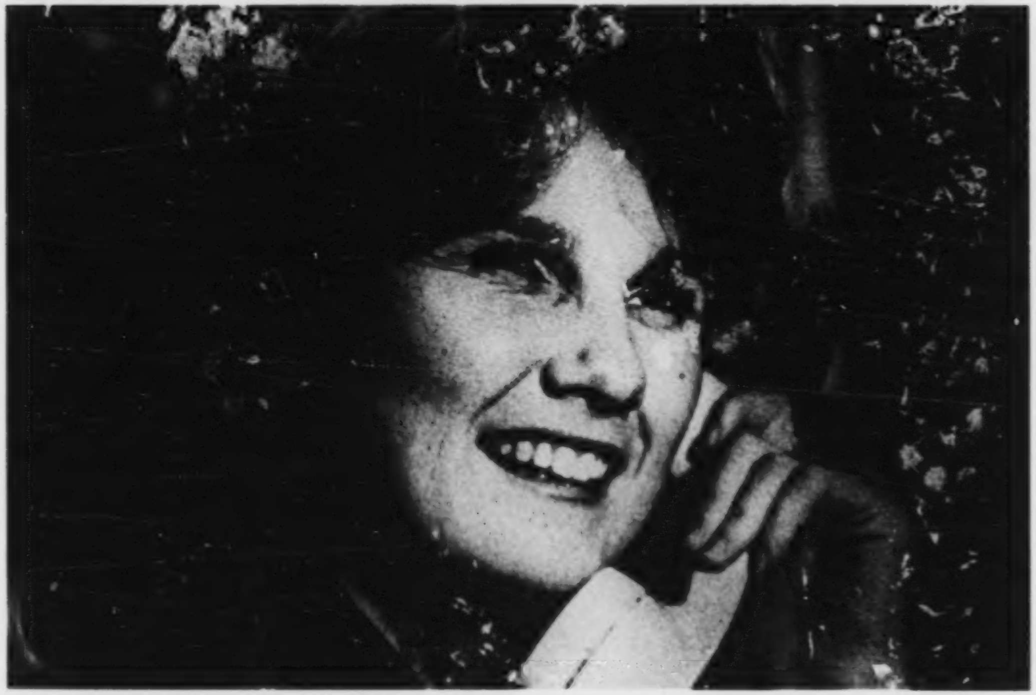
Image Breakdown During Run



Too much dampener form roller pressure • Too much ink form roller pressure • Too much plate-to-blanket pressure • Fountain solution too strong • End play in form rollers •

TM 10

GIII-T119

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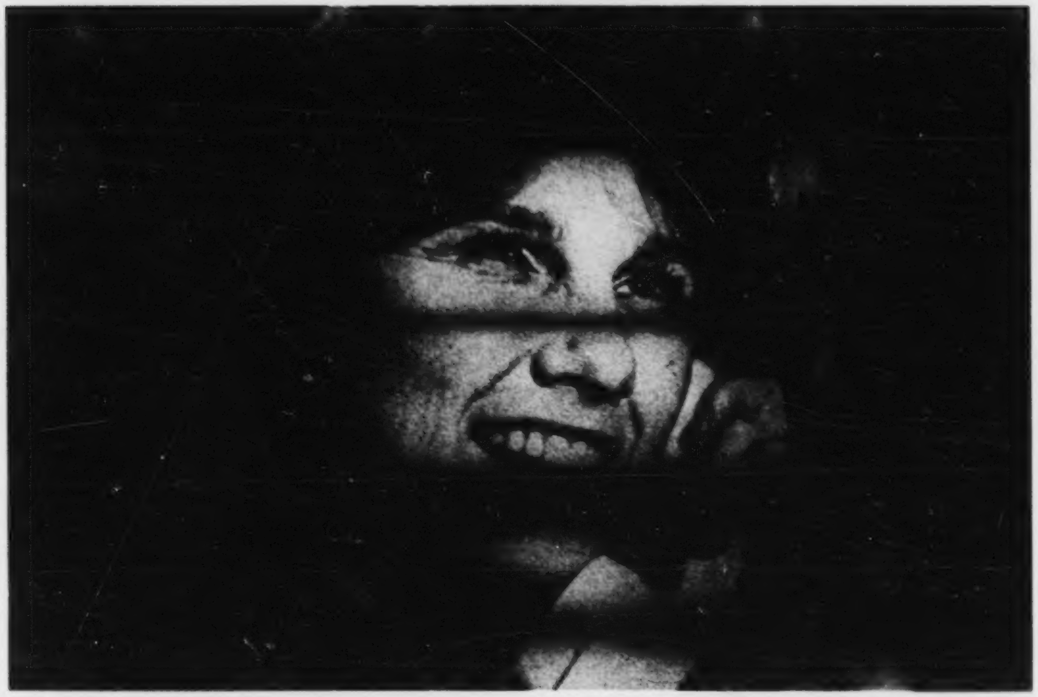
Streaking



Incorrect ink form roller pressure • Incorrect dampener form roller pressure • Incorrect plate-to-blanket pressure • Improper ink • Loose blanket •

TM 11

GIII-T121

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Improper Register

Loose blanket • Side guides not set properly • Paper not cut straight • Cam band not set •

TM 12

GIII-T123

BEST COPY AVAILABLE

No Image At All

Not enough ink roller form pressure • Not enough plate-to-blanket pressure • Not enough impression-to-blanket pressure • Too much moisture • Glazed blanket • Glazed ink rollers •

BEST COPY AVAILABLE

Paper Curling in Receiver

Too much moisture • Curl in paper •

BEST COPY AVAILABLE

Paper Nicking on Edge

Paper stop fingers too high • Feed rollers not set properly • Paper hitting back stop in receiver too hard •

TM 15

GIII-T129

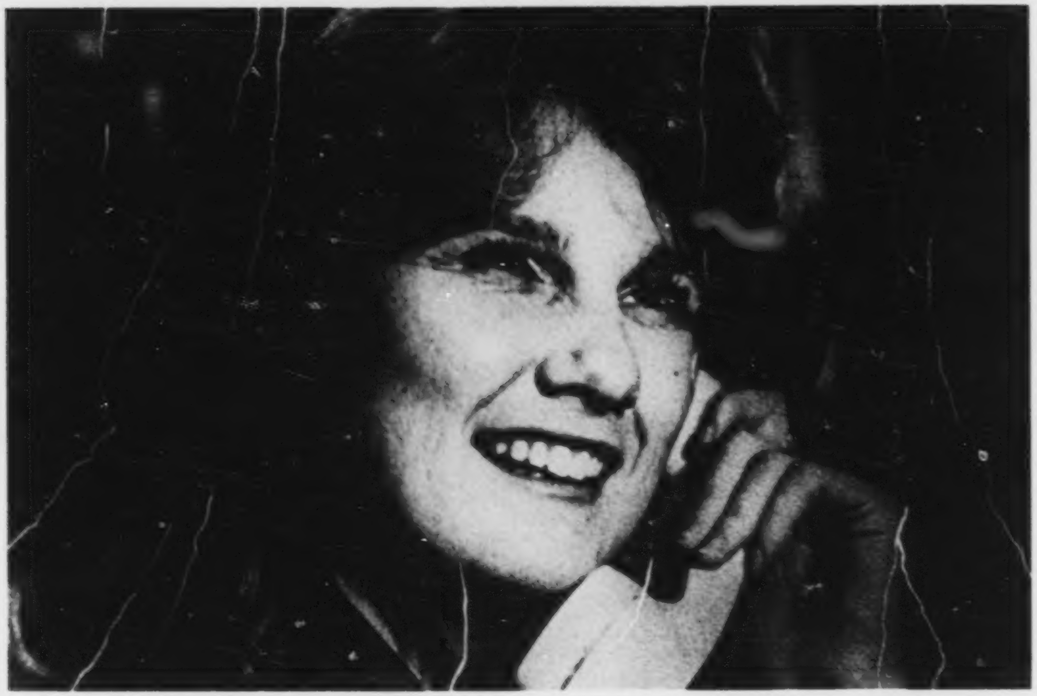
BEST COPY AVAILABLE

Paper Missing Grippers

Stop fingers incorrectly set • Feed rollers out of adjustment •

BEST COPY AVAILABLE

Paper Wrinkling



Too much moisture • Paper damp • Too much pressure between blanket and impression cylinder • Register board not set properly •

BEST COPY AVAILABLE

JOB TICKET AND COST AWARENESS
UNIT V

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/ reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to teaching this unit.)

B. Make transparencies from the transparency masters included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information sheet and student supplements.

F. Discuss information and assignment sheets.

(NOTE: Use the transparencies and student supplements to enhance the information as needed.)

G. Integrate the following activities throughout the teaching of this unit:

1. Collect sample job tickets from local print shops.
2. Complete a job ticket for a shop printing project.
3. Invite local printers to address the class on cost awareness, waste management, pricing, and overall costs of doing business.
4. Met individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

H. Give test.

I. Evaluate test.

J. Reteach if necessary.

RESOURCES USED IN DEVELOPING THIS UNIT

A. *Franklin Offset Catalog.* Salt Lake City, UT: Porte Publishing Co.

B. *The Lithographers Manual,* Ninth Edition. Ed. Thomas M. Destree. Pittsburgh, PA: Graphic Arts Technical Foundation, Inc., 1994.

SUGGESTED ACTIVITIES

C. Silver, Gerald A. *Printing Estimating Policies and Procedures*. Encino, CA: Editorial Enterprises, 1991.

SUGGESTED SUPPLEMENTAL MATERIAL

Graphics Master 6. Kihei, HI: Dean LemAssociates, Inc. 1996.

JOB TICKET AND COST AWARENESS
UNIT V

ANSWERS TO ASSIGNMENT SHEET

Assignment Sheet #1

1. $34.25 (Based on costs for paper, simple composition, film price, and plate price given in Student Supplement 1.)

2. $77.50 (Based on costs for 8 ½ x 11 paper, simple composition, film price, and plate price given in Student Supplement 1.)

JOB TICKET AND COST AWARENESS
UNIT V

TEST

Name ______________________________ **Score** ____________________

1. Match the terms related to cost awareness on the right with their correct definitions.

______a. That part of the cost which is an hourly wage rate paid to employees working on the job

______b. The consumable items required for the printing job, such as paper, ink, plates, etc.

______c. A detailed statement of all costs and charges related to a printing job

______d. Any cost that does not change with production volume, such as rent or utilities

______e. Any cost that increases or decreases directly with production volume, such as paper, ink, and film

______f. A predetermined percentage added to the job price to recover combined expenses and profit

______g. The amount of revenue left after direct printing costs have been paid

______h. The amount of revenue left after all costs, fixed and variable, have been paid

______i. The actual selling price of the printing job, quoted and recorded

______j. The bill for the customer's printing job

1. Markup
2. Fixed cost
3. Labor
4. Net profit
5. Estimate
6. Materials
7. Invoice
8. Gross profit
9. Quotation
10. Variable cost

2. List three fixed costs and three variable costs of a printing job.

a. Fixed costs

1) ____

2) ____

3) ____

TEST

b. Variable costs

1) ______________________________

2) ______________________________

3) ______________________________

3. List six cost items to consider when giving an estimate on a printing job.

a. ______________________________

b. ______________________________

c. ______________________________

d. ______________________________

e. ______________________________

f. ______________________________

4. Select from a list cost awareness factors for a successful printing business by placing an "X" in each appropriate blank.

_____a. Net Profit

_____b. Production quality

_____c. Advertising

_____d. Wages and salaries

_____e. Cost of equipment

_____f. High prices

_____g. Waste management

5. Select proper practices for waste management in the printing shop by placing an "X" in each appropriate blank.

_____a. Throw away useless trim waste.

_____b. Save plates and negatives for silver and aluminum reclamation.

_____c. Schedule press runs randomly.

_____d. Plan bulk paper cuts carefully to avoid waste.

TEST

6. State the definition of a job ticket.

____

____

____

____

7. List six major components of a job ticket, other than the customer's name, address and telephone number.

a. ____

b. ____

c. ____

d. ____

e. ____

f. ____

8. Select true statements concerning printing trade customs by placing an "X" in each appropriate blank.

_____a. Printer is not responsible for errors if work is completed with customer's approval.

_____b. An extra charge will be made if a delay on the press results from awaiting customer's approval of press proofs.

_____c. Experimental work shall be done free of charge.

_____d. Overruns or underruns of up to 10% shall be charged or credited to the customer.

_____e. Terms shall be net cash within thirty days unless otherwise specified, and claims must be made within five days of receipt of goods.

_____f. All agreements are contingent upon fires, strikes, accidents, wars, floods, or other causes beyond the printer's control.

_____g. There shall be no variation in color between color proofs and the completed job.

_____h. Changes made by the customer shall be made free of charge.

_____i. All sketches, dummies, negatives, and plates shall be returned to the customer after work is completed.

TEST

_____j. Regular orders cannot be cancelled unless an agreement to cover the printer's loss has been made.

_____k. Customer shall be charged for handling and storing personal paper stock or printed matter held over thirty days.

***Permission to duplicate this test is granted.**

JOB TICKET AND COST AWARENESS
UNIT V

ANSWERS TO TEST

1. a. 3
   b. 6
   c. 5
   d. 2
   e. 10
   f. 1
   g. 8
   h. 4
   i. 9
   j. 7

2. Answer should include any three of the following in each group:

   a. Fixed Costs
      1) Insurance
      2) Advertising
      3) Taxes
      4) Building rental
      5) Utilities
      6) Maintenance

   b. Variable Costs
      1) Labor
      2) Paper
      3) Ink
      4) Plates
      5) Film

3. Any six of the following:

   a. Composition
   b. Line negatives
   c. Halftone negatives
   d. Plates
   e. Press runs
   f. Ink
   g. Bindery charges
   h. Paper stock
   i. Labor

4. a, b, d, e, g

5. b, d

6. A job ticket is the formal written specification sheet which serves as a blueprint for the printing job and follows a job from order taking to delivery.

ANSWERS TO TEST

7. Any six of the following:

   a. Customer representative
   b. Date promised
   c. Sample of job
   d. Current price quotation
   e. Stock to be used
   f. Ink to be used
   g. Finishing and binding requirements
   h. Time spent at each station
   i. Layout sheet or dummy for multi-page jobs
   j. Typesetting specifications
   k. Photo and darkroom instructions
   l. Press requirements
   m. Delivery instructions

8. a, b, d, e, f, j, k

JOB TICKET AND COST AWARENESS
UNIT V

UNIT EVALUATION FORM

Student Name ________________________________ Unit Rating ______

Assignment Sheet Rating

Assignment Sheet #1—Estimate Costs of Printing Jobs Rating _____

Comments: ____

____

Written-Test Scores

Pretest _____ Posttest____ Other _____

Other

____

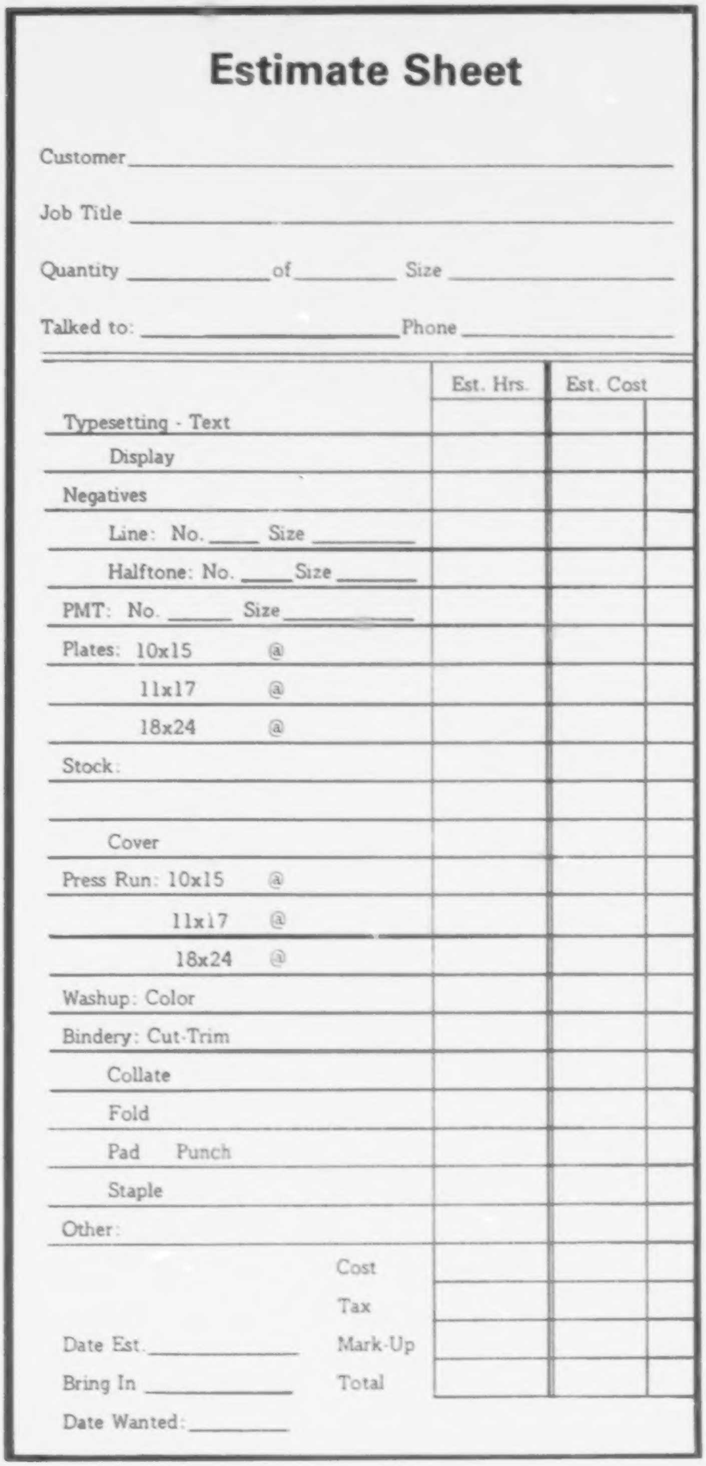
____

Teacher Signature ________________________________ Date ___________

Student Signature ________________________________ Date ___________

*Permission to duplicate this form is granted.

Sample Estimate Sheet



Estimate Sheet

Customer ____________________

Job Title ____________________

Quantity __________ of ________ Size __________

Talked to: ______________ Phone __________

	Est. Hrs.	Est. Cost	
Typesetting - Text			
Display			
Negatives			
Line: No. ____ Size ________			
Halftone: No. ____ Size ______			
PMT: No. _____ Size __________			
Plates: 10x15 @			
11x17 @			
18x24 @			
Stock:			
Cover			
Press Run: 10x15 @			
11x17 @			
18x24 @			
Washup: Color			
Bindery: Cut-Trim			
Collate			
Fold			
Pad Punch			
Staple			
Other:			
Cost			
Tax			
Mark-Up			
Total			

Date Est. __________

Bring In __________

Date Wanted: ________

TM 1

Sample Material Cost Sheet

Film Prices

9 x 12 or Less	$1.50
Larger than 9 x 12	$3.00
12 x 18	$3.50

Plate Prices

10 x 15 'E'	$1.50
10 x 15 'M'	$2.00
11 x 18 'M'	$2.50
11 x 18½'M'	$2.50

Contact Prints

Less than 10 x 12	$1.00
10 x 12	$1.50

Composition	(Simple)	(Complex)
5½ x 8½	$5.25	$7.00
8½ x 11	9.50	14.50
Business Cards	4.00	5.00
Letterheads	5.25	7.50
Envelopes	4.00	5.25
Ruled Forms (5½ x 8½)	12.00	15.00
Rules Forms (8½ x 11)	15.00	20.00

Reprints (Plate on File)
$3.50 + Stock + 30%
Stock Furnished
Add all charges + 30%,
then subtract stock cost.
Colors
Add $3.50 for second color.
Add $9.00 for additional colors.

Collating
$ .65 per Hundred Sheets
$ .35 per Hundred Sheets (Over 1M)
Folding
$ .15 per Hundred Sheets
Stitching
$ .03 per Book or Set
Padding
$ .15 per Pad

Pictures

Halftones 5 x 7 or Less	$4.00
Halftones Larger than 5 x 7	$5.00

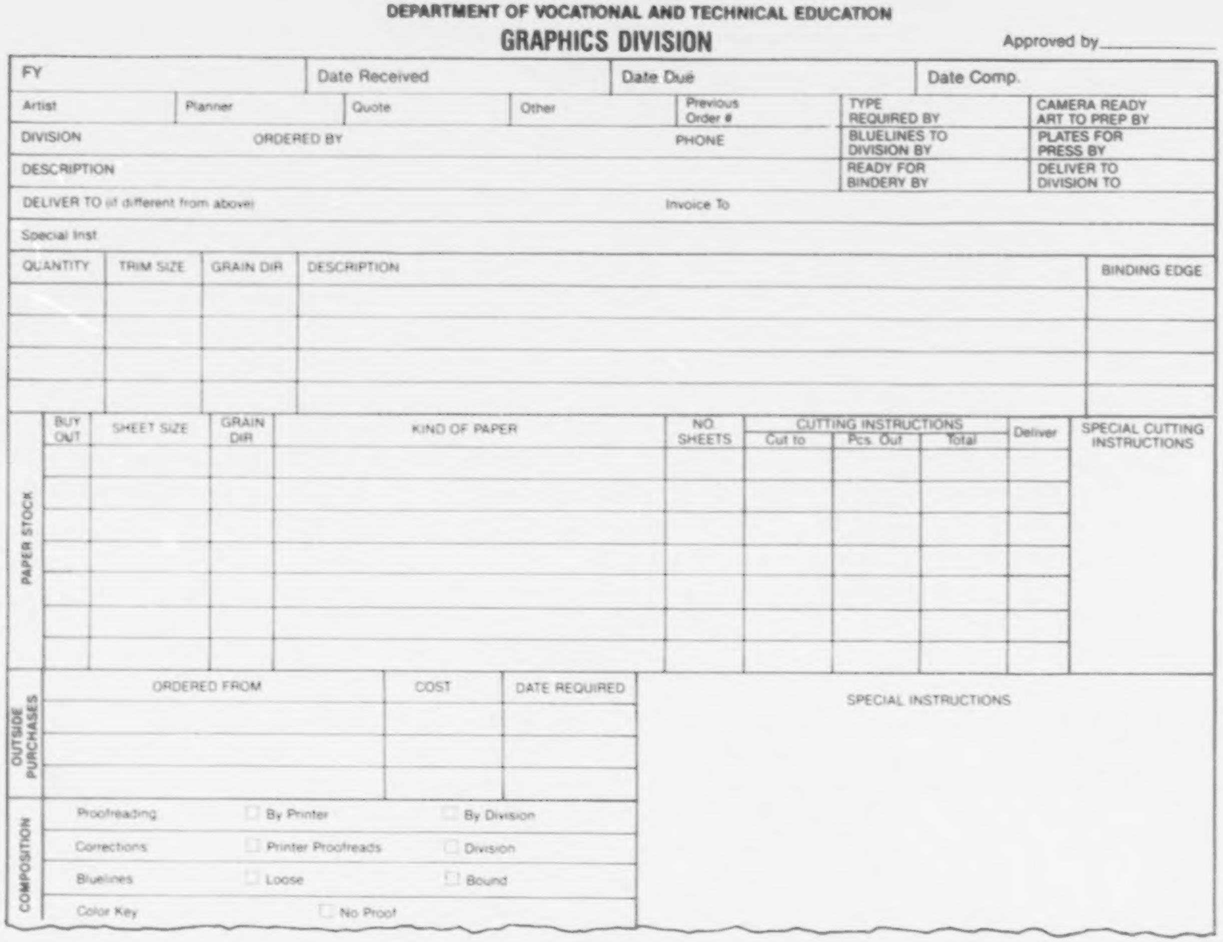
* Outside printing is priced at material cost plus 30%.

* Charge for posters and handbills on the basis of simple composition.

PAPER PRICES

Bond	**8½ x 11**	**8½ x 14**
20 Lb. White	$1.20 per Hundred	$1.40 per Hundred
20 Lb. Colors	1.50 per Hundred	1.70 per Hundred
(2 Reams or More)	4.80 per Ream	5.20 per Ream
Index	**8½ x 11**	
110 Lb. White	$1.70 per Hundred	
110 Lb. Colors	1.80 per Hundred	
Carbonless	**8½ x 11**	**8½ x 14**
2-Part	$24.00 (500 Sets)	$28.00 (500 Sets)
3-Part	42.00 (500 Sets)	49.00 (500 Sets)
4-part	60.00 (500 Sets)	68.00 (500 Sets)
Scott Offset	**8½ x 11**	**11 x 17**
70 Lb. White	$1.40 per Hundred	$1.80 per Hundred
70 Lb. Colors	1.70 per Hundred	2.10 per Hundred
60 Lb. White	1.30 per Hundred	1.60 per Hundred
60 Lb. Colors	1.70 per Hundred	1.90 per Hundred

Sample Job Ticket (Top)



DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION

GRAPHICS DIVISION

Approved by__________

FY		Date Received		Date Due		Date Comp.
Artist	Planner	Quote	Other	Previous Order #	TYPE REQUIRED BY	CAMERA READY ART TO PREP BY
DIVISION		ORDERED BY		PHONE	BLUELINES TO DIVISION BY	PLATES FOR PRESS BY
DESCRIPTION					READY FOR BINDERY BY	DELIVER TO DIVISION TO
DELIVER TO (if different from above)				Invoice To		
Special Inst						

QUANTITY	TRIM SIZE	GRAIN DIR	DESCRIPTION	BINDING EDGE

PAPER STOCK

BUY OUT	SHEET SIZE	GRAIN DIR	KIND OF PAPER	NO. SHEETS	CUTTING INSTRUCTIONS			Deliver	SPECIAL CUTTING INSTRUCTIONS
					Cut to	Pcs. Out	Total		

OUTSIDE PURCHASES

ORDERED FROM	COST	DATE REQUIRED

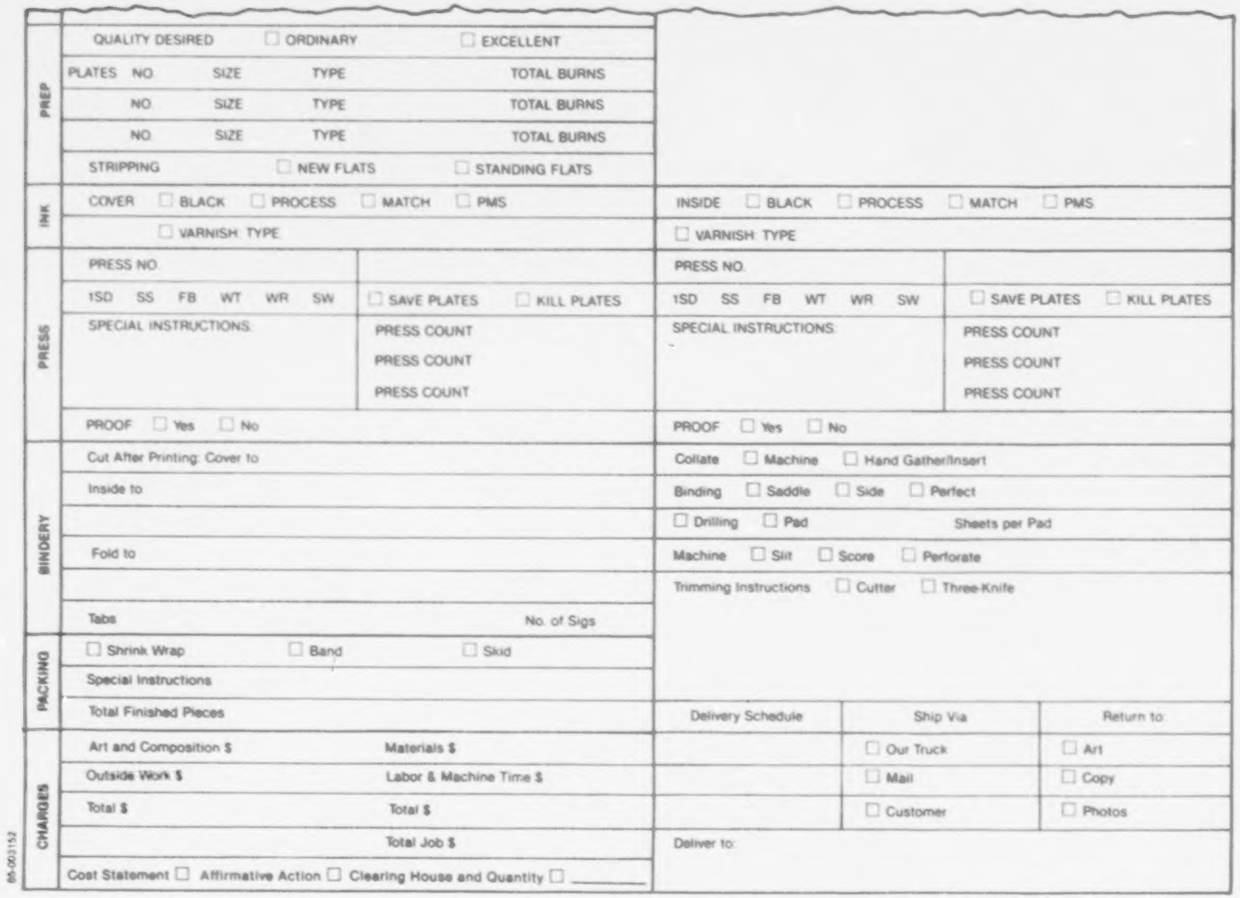
SPECIAL INSTRUCTIONS

COMPOSITION

Proofreading	☐ By Printer	☐ By Division
Corrections	☐ Printer Proofreads	☐ Division
Bluelines	☐ Loose	☐ Bound
Color Key	☐ No Proof	

BEST COPY AVAILABLE

Sample Job Ticket (Bottom)



PREP	QUALITY DESIRED ☐ ORDINARY ☐ EXCELLENT				
	PLATES NO. SIZE TYPE TOTAL BURNS				
	NO. SIZE TYPE TOTAL BURNS				
	NO. SIZE TYPE TOTAL BURNS				
	STRIPPING ☐ NEW FLATS ☐ STANDING FLATS				
INK	COVER ☐ BLACK ☐ PROCESS ☐ MATCH ☐ PMS		INSIDE ☐ BLACK ☐ PROCESS ☐ MATCH ☐ PMS		
	☐ VARNISH: TYPE		☐ VARNISH: TYPE		
PRESS	PRESS NO.		PRESS NO.		
	1SD SS FB WT WR SW	☐ SAVE PLATES ☐ KILL PLATES	1SD SS FB WT WR SW	☐ SAVE PLATES ☐ KILL PLATES	
	SPECIAL INSTRUCTIONS	PRESS COUNT PRESS COUNT PRESS COUNT	SPECIAL INSTRUCTIONS	PRESS COUNT PRESS COUNT PRESS COUNT	
	PROOF ☐ Yes ☐ No		PROOF ☐ Yes ☐ No		
BINDERY	Cut After Printing: Cover to		Collate ☐ Machine ☐ Hand Gather/Insert		
	Inside to		Binding ☐ Saddle ☐ Side ☐ Perfect		
			☐ Drilling ☐ Pad Sheets per Pad		
	Fold to		Machine ☐ Slit ☐ Score ☐ Perforate		
			Trimming Instructions ☐ Cutter ☐ Three-Knife		
	Tabs	No. of Sigs			
PACKING	☐ Shrink Wrap ☐ Band ☐ Skid				
	Special Instructions				
	Total Finished Pieces		Delivery Schedule	Ship Via	Return to
CHARGES	Art and Composition $	Materials $		☐ Our Truck	☐ Art
	Outside Work $	Labor & Machine Time $		☐ Mail	☐ Copy
	Total $	Total $		☐ Customer	☐ Photos
		Total Job $	Deliver to:		
	Cost Statement ☐ Affirmative Action ☐ Clearing House and Quantity ☐ ______				

85-003152

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CALCULATING PAPER CUTTING
UNIT VI

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to teaching this unit.)

B. Make transparency from the transparency master included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information sheet and assignment sheets.

F. Discuss information and assignment sheets.

(NOTE: Use the transparency to enhance the information as needed.)

G. Provide students with job sheet. Evaluate student performance according to criteria on the job sheet.

H. Discuss and demonstrate the procedure outlined in the job sheet.

I. Integrate the following activities throughout the teaching of this unit:

1. Discuss with students how paper weight and texture affect cutting.
2. Demonstrate hand jogging procedure in class, then have students demonstrate hand jogging.
3. Demonstrate safety rules for operating paper cutters.
4. Have students trim a three-sided book, if possible.
5. Contact the Graphic Arts Technical Foundation, 4615 Forbes Avenue, Pittsburgh, PA 15213-3796, to obtain a list of possible supplemental resources.
6. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

J. Give test.

K. Evaluate test.

L. Reteach if necessary.

SUGGESTED ACTIVITIES

REFERENCES USED IN WRITING THIS UNIT

A. Cogoli, John E. *Photo-Offset Fundamentals.* Old Tappan, NJ: MacMillan Publishing Co., Inc., 1986.

B. Hird, Kenneth F. *Offset Lithographic Technology.* Tinley Park, IL: Goodheart-Willcox Publisher, 1995.

C. Prust, Z. A. *Photo-Offset Lithography.* Tinley Park, IL: Goodheart-Willcox Publisher, 1977.

D. *Safety Practices for the Graphic Arts.* Pittsburgh, PA: Graphic Arts Technical Foundation, 1984.

E. Spence, William D. and David G. Vequist. *Graphic Reproduction.* Westerville, OH: Glencoe McGraw-Hill, 1980.

SUGGESTED SUPPLEMENTAL RESOURCES

A. *Handbook for Graphic Communications.* Pittsburgh, PA: Graphic Arts Technical Foundation.

B. *Paper Estimating*, Pittsburgh, PA: Graphic Arts Technical Foundation, 1990.

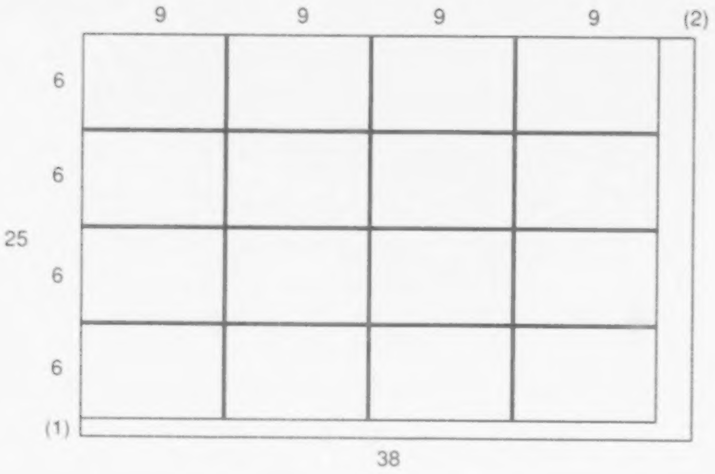
C. *The Lithographers Manual.* Ninth Edition. Ed. Thomas M. Destree. Pittsburgh, PA: Graphic Arts Technical Foundation.

CALCULATING PAPER CUTTING
UNIT VI

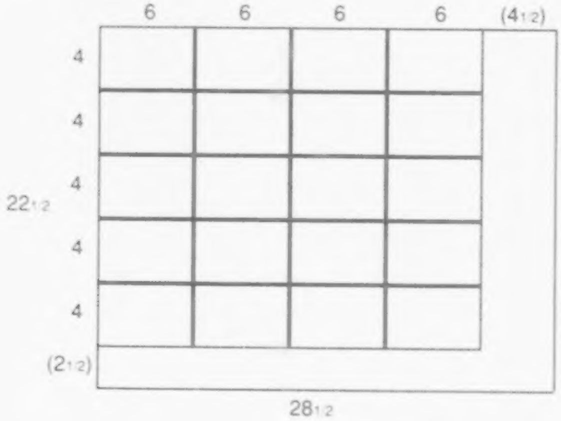
ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #1

1. a. 16
   b. 12
   c.



2. a. 20
   b.



3. 56

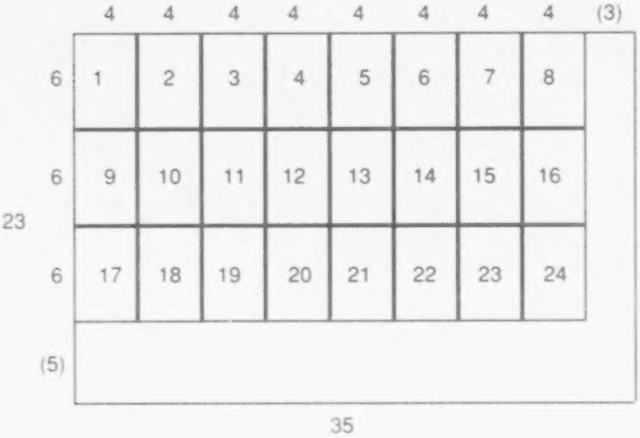
ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #2

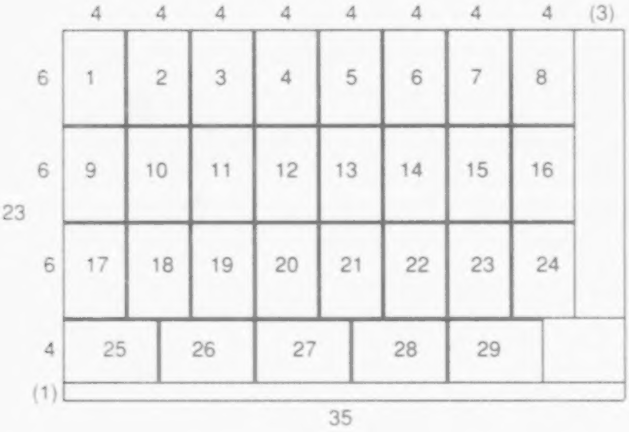
1. 30
2. 34

Assignment Sheet #3

1. 24
2. a.



b.

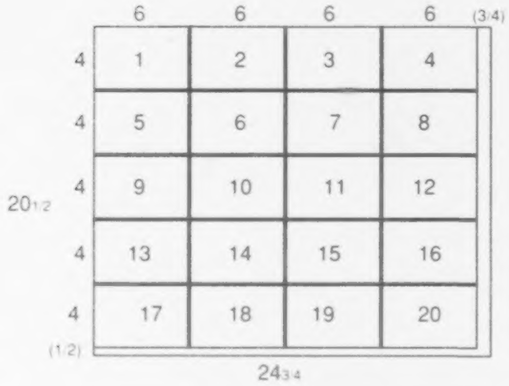


3. 5

ANSWERS TO ASSIGNMENT SHEETS

Assignment Sheet #4

1. 20
2. Diagram should look like the following:



CALCULATING PAPER CUTTING
UNIT VI

TEST

Name ______________________________ Score ____________________

1. Match the terms on the right with their correct definitions.

_____a. Cut that allows for actual outside dimensions of a piece of printed matter to be cut after printing is completed

_____b. Percentage of extra sheets added to the total job for replacing soiled, damaged or misprinted sheets and for samples to run when setting up the press

_____c. Paper coated or impregnated with chemicals to yield an image when pressure is applied

_____d. Second cut, made in stock cutting, when grain direction is not a factor, and additional pieces can be cut from the waste of the first cut

_____e. Job-size portion cut from the full-size sheet

_____f. Device used to vibrate sheets into neat lifts

_____g. Proportional drawing which maps the most cost-efficient method of cutting sheets for a given job

_____h. Handling of sheets to make a neat, evenly piled stack

_____i. Wooden tools or blocks used to move or adjust lifts of paper on paper cutter so as to avoid accidentally placing hands or fingers in the way of the cutting blade

_____j. Stack of paper being cut or handled

1. Carbonless paper
2. Combination cut
3. Cutting diagram
4. Jogging
5. Jogging boards
6. Lift
7. Mechanical jogging table
8. Piece
9. Spoilage allowance
10. Trim cut

TEST

2. Select true statements concerning safety rules for operating a paper cutter by placing an "X" in the blank next to each true statement.

_____a. Check the safety bolt and brake action on powered cutters periodically.

_____b. Never disable two-hand controls.

_____c. Never reach under the knife to remove scrap or straighten a lift.

_____d. Attempt to catch a falling stack of cut stock during the cutting cycle if a backup board is not in use.

_____e. Keep the cutter and surrounding floor area free of tools, paper, and shop towels.

_____f. Avoid distractions while operating the cutter.

_____g. Helpers and other shop personnel must stand near the cutter during cutting cycles.

_____h. All knives and cutting sticks are to be changed according to machine's operating manual.

_____i. Keep all spare knives bolted to mounting boards.

_____j. Always turn off power to cutter before leaving the machine unattended.

3. State the purpose of jogging paper before cutting.

____

____

4. List the two types of paper cutters.

a. ____

b. ____

5. Describe two techniques for cutting carbonless paper.

a. ____

b. ____

TEST

6. State the formula for cutting paper stock.

7. State the formula for determining the number of sheets to be cut for a printing job.

8. State the formulas for making a combination cut.

*Permission to duplicate this test is granted.

CALCULATING PAPER CUTTING
UNIT VI

ANSWERS TO TEST

1. a. 10
   b. 9
   c. 1
   d. 2
   e. 8
   f. 7
   g. 3
   h. 4
   i. 5
   j. 6

2. b, c, e, f, h, i, j

3. To ensure that all sheets of paper are cut the same size

4. a. Hand-lever paper cutter
   b. Electric or electro-hydraulic paper cutter

5. a. Use a wood block and sponge buffer.
   b. Cut two or more lifts at one time.

6. $$\frac{\text{Dimensions of Sheet}}{\text{Dimension of Piece to be Cut}} = \text{Number of Pieces Cut from Sheet}$$

7. $$\frac{\text{Desired Number of Pieces}}{\text{Number of Pieces Obtained from One Sheet}} = \text{Total Number of Sheets Needed}$$

8. a. $$\frac{\text{Dimensions of Sheet}}{\text{Dimension of Piece to be Cut}} = \text{Number of Pieces Cut from Sheet}$$

   b. $$\frac{\text{Waste Portion}}{\text{Dimension of Piece to be Cut}} = \text{Number of Pieces Obtained}$$

CALCULATING PAPER CUTTING
UNIT VI

Unit Evaluation Form

Student Name ______________________________ Unit Rating ______

Assignment Sheet Ratings

Assignment Sheet #1—Use the Formula for Cutting Paper Stock Rating _____

Comments: ____

____

Assignment Sheet #2—Use the Formula to Determine How Many Sheets Will be Required Rating _____

Comments: ____

____

Assignment Sheet #3—Calculate Combination Cut Using Stock Cutting Formula Rating _____

Comments: ____

____

Assignment Sheet #4—Draw a Cutting Diagram Rating _____

Comments: ____

____

Job Sheet Ratings

Job Sheet #1—Cut Carbonless Paper Rating _____

Comments: ____

____

UNIT EVALUATION FORM

Written-Test Scores

Pretest _____ Posttest____ Other _____

Other

____

____

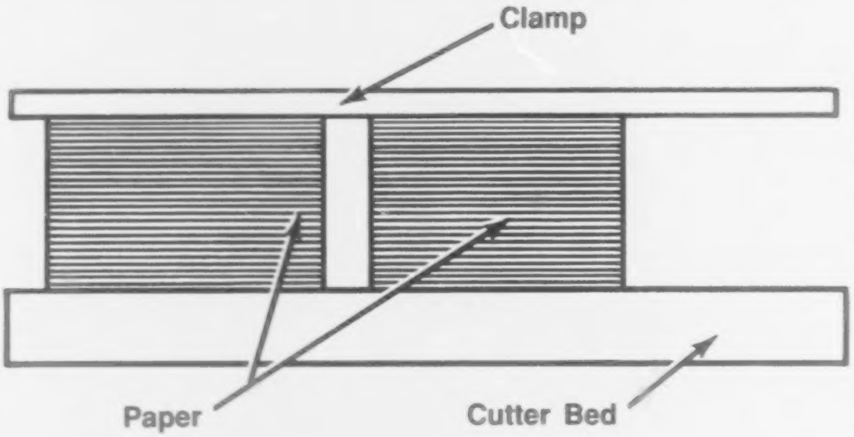
Teacher Signature __________________________________ Date ____________

Student Signature __________________________________ Date ____________

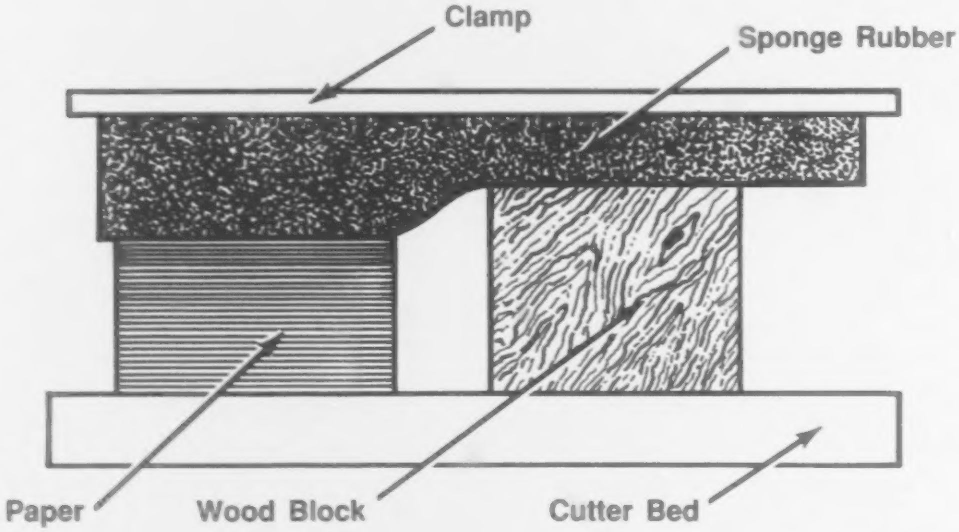
*Permission to duplicate this form is granted.

Cutting Carbonless Paper

(Techniques to Avoid Unwanted Imaging)



Cutting two or more lifts at one time will reduce pressure that can cause unwanted imaging.



Using a wood block and sponge rubber will prevent excessive pressure that can cause imaging.

BINDING AND FINISHING
UNIT VII

SUGGESTED ACTIVITIES

A. Obtain additional materials and/or invite resource people to class to supplement/reinforce information provided in this unit of instruction.

(NOTE: This activity should be completed prior to teaching this unit.)

B. Make transparency from the transparency master included with this unit.

C. Provide students with objective sheet.

D. Discuss unit and specific objectives.

E. Provide students with information sheet and Student Supplement 1.

F. Discuss information sheet.

(NOTE: Use the transparency to enhance the information as needed.)

G. Provide students with job sheet.

H. Discuss and demonstrate the procedures outlined in the job sheets. Evaluate student performance according to criteria on the job sheet.

I. Integrate the following activities throughout the teaching of this unit:

  1. Take a field trip to a local shop to observe binding and finishing operations in action.

  2. Invite a local printer or bindery worker to address the class concerning job specifications, customer relations, customer service, and meeting customer needs.

  3. Meet individually with students to evaluate their progress through this unit of instruction, and indicate to them possible areas for improvement.

J. Give test.

K. Evaluate test.

L. Reteach if necessary.

SUGGESTED ACTIVITIES

RESOURCES USED IN DEVELOPING THIS UNIT

A. Cogoli, John E., *Photo-Offset Fundamentals.* Old Tappan, IL: MacMillan Publishing Co., Inc. 1986.

B. *Pocket Pal: A Graphic Arts Production Handbook.* Memphis, TN: International Paper Co., 1992

C. Prust, Z. A., *Photo-Offset Lithography.* Tinley Park, IL: Goodheart-Willcox Publisher, 1977.

BINDING AND FINISHING
UNIT VII

TEST

Name ______________________________ Score ____________________

1. Match the terms related to binding and finishing on the right with their correct definitions.

_____a. Creasing a sheet mechanically or manually to enable it to fold easily

_____b. Partially cutting a sheet in a broken line so it can easily be torn away

_____c. Applying a small amount of adhesive to the edge of a sheet so it can be attached to another

_____d. Gathering, arranging in order and checking several sheets to make a book

_____e. Placing one signature, sheet, or folded sheet inside another

_____f. Binding pages of a book together using wire stitches or staples

_____g. Cutting the edges of a bound book to make them even

_____h. Binding a booklet or multi-page job using an adhesive padding compound

_____i. Securing pages together by means of wire, thread, adhesive, plastic, etc.

_____j. Final bindery work, such as die cutting, varnishing, flocking, laminating or embossing

_____k. Vibrating paper by machine or by hand to make sure all sheets line up evenly at the edges

_____l. Joining collated sets when number of pages exceeds collator capacity

1. Trimming
2. Stitching
3. Scoring
4. Jogging
5. Finishing
6. Perforating
7. Inserting
8. Binding
9. Padding
10. Tipping
11. Collating
12. Marrying sets

TEST

2. Select true statements concerning various binding techniques by placing an "X" in the appropriate blanks.

______a. Books which must stand up to hard use require edition binding.

______b. In edition binding, several signatures are sewn together and glued.

______c. Adhesive binding is used for less expensive books.

______d. Top quality books use a form of adhesive binding.

______e. In perfect binding, the back or folded edge of the book is sawed off and glued.

______f. A brittle glue is used to attach the cover in perfect binding.

______g. In plastic binding, rectangular slots are punched in the sheets.

______h. Pages cannot be added or changed in plastic bound books.

______i. The ring binder is an example of looseleaf binding.

3. List four major paper folding styles.

a. ____

b. ____

c. ____

d. ____

4. List four processes associated with finishing activities.

a. ____

b. ____

c. ____

d. ____

*Permission to duplicate this test is granted.

BINDING AND FINISHING
UNIT VII

ANSWERS TO TEST

1.

a.	3	e.	7	i.	8
b.	6	f.	2	j.	5
c.	10	g.	1	k.	4
d.	11	h.	9	l.	12

2. a, b, c, e, g, i

3. Any four of the following:

   a. Accordion fold
   b. Gate fold
   c. Letter fold
   d. Map fold
   e. French fold
   f. Broadside fold

4. Any four of the following:

   a. Foil stamping
   b. Embossing
   c. Laminating
   d. Varnishing
   e. Flocking

BINDING AND FINISHING
UNIT VII

UNIT EVALUATION FORM

Student Name ______________________________ Unit Rating ______

Job Sheet Ratings

Job Sheet #1—Pad 20-Pound Stock Rating _____

Comments: ____

____

Job Sheet #2—Pad Carbonless Paper Rating _____

Comments: ____

____

Job Sheet #3—Drill Paper Stock for a 3-Ring Binder Rating _____

Comments: ____

____

Job Sheet #4—Fold Paper Using Folding Machine Rating _____

Comments: ____

____

Job Sheet #5—Hand Fold, Collate and Staple a Booklet Rating _____

Comments: ____

____

Job Sheet #6—Score a Job Rating _____

Comments: ____

____

UNIT EVALUATION FORM

Written-Test Scores

Pretest _____ Posttest____ Other _____

Other

____

____

Teacher Signature ______________________________________ Date ____________

Student Signature ______________________________________ Date ____________

*Permission to duplicate this form is granted.

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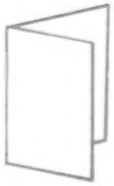

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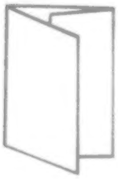

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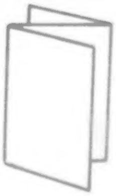

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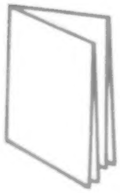

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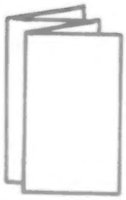

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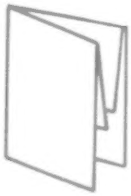

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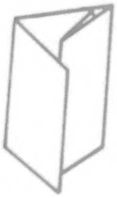

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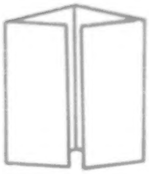

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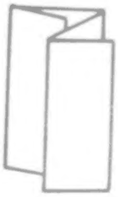

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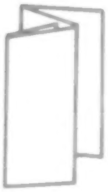
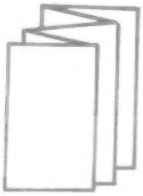


8-Page
Reverse Map



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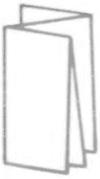

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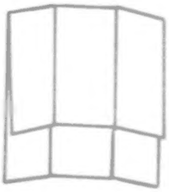

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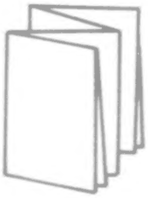
Broadside



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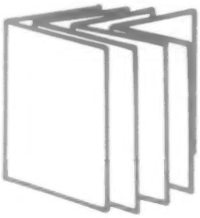
Broadside

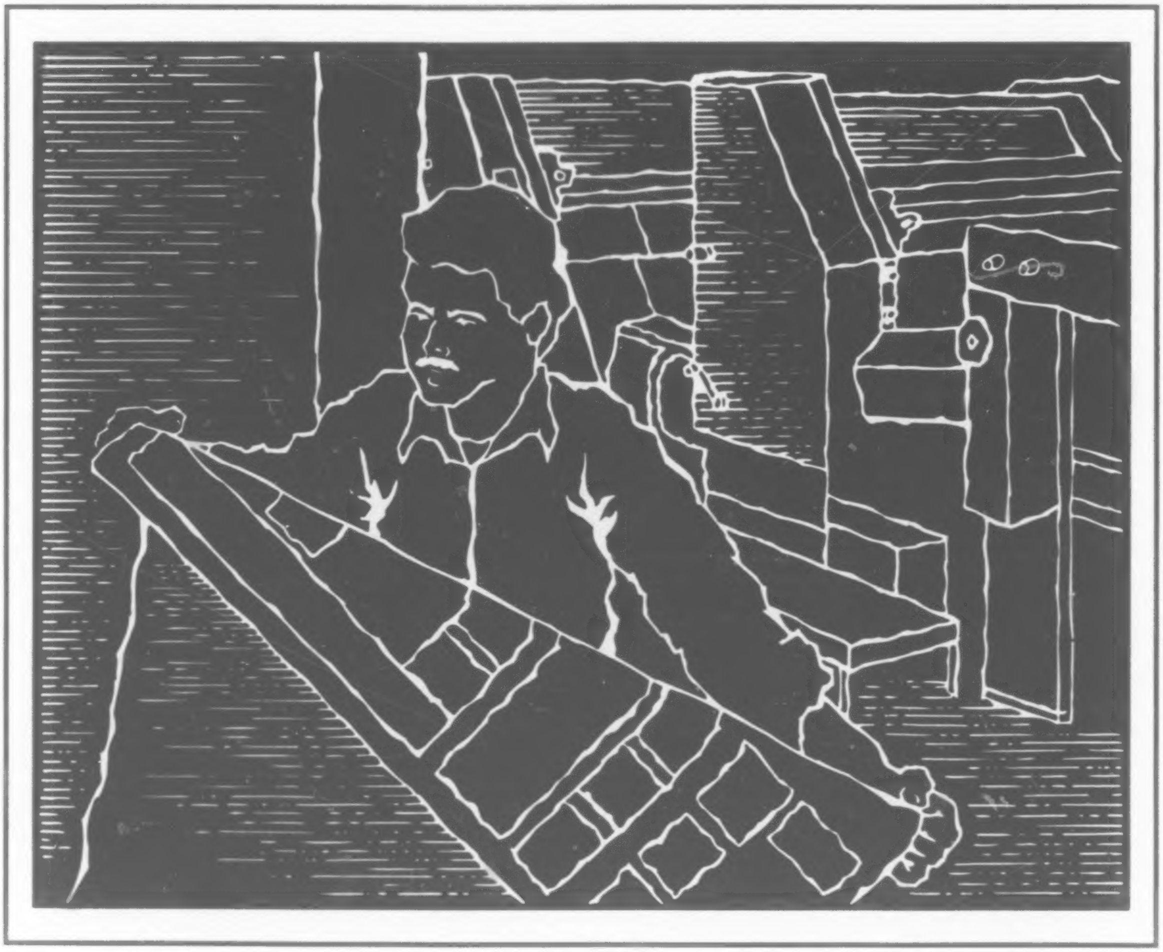


16-Page
Booklet

(Courtesy A. B. Dick Company)

GRAPHIC ARTS

THE PRESS AND FINISHING PROCESSES



STUDENT EDITION

MAVCC

Graphic Arts

The Press and Finishing Processes

Third Edition

Student Edition

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Graphic Arts
The Press and Finishing Processes
Third Edition

Student Edition

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OFFSET PRESS SYSTEMS
UNIT I

UNIT OBJECTIVE

After completion of this unit, the student should have a working knowledge of the basic theory of offset printing and be able to identify the basic systems and various components of a typical sheet fed offset press. Competencies will be demonstrated by completing the job sheet and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to offset press systems with their correct definitions.
2. State the basic theory of offset printing.
3. Identify the basic systems of a typical sheet fed offset press.
4. Match the basic systems of a typical sheet fed offset press with their functions.
5. Identify the components of the feeder system of a typical offset press.
6. Match components of the feeder system of a typical offset press.
7. Match the types of feeder systems used on offset presses with their operations.
8. Identify the components of the register system of a typical offset press.
9. Match components of the register system with their functions.
10. Name the two types of register systems used on sheet fed offset presses.
11. Identify the components of the cylinder system in a typical offset press.
12. Match components of the cylinder system with their functions.
13. Identify offset press cylinder arrangements.
14. Identify the components of the inking system of a typical offset press.
15. Identify the components of the dampening system of a typical offset press.
16. Match components of the inking/dampening system with their functions.
17. Distinguish between the two types of dampening systems.
18. Identify the components of the delivery system of a typical offset press.

OBJECTIVE SHEET

19. Match components of the delivery system with their functions.

20. Match types of delivery systems with their descriptions.

21. Test the basic theory of offset printing. (Job Sheet #1)

OFFSET PRESS SYSTEMS
UNIT I

INFORMATION SHEET

I. Terms and definitions

A. Delivery – The operation of an offset press in controlling the paper after the image is printed

B. Fountain solution – A chemical mixture applied to the nonimage areas of an offset plate to repel ink

C. Ink – A substance applied to the image areas of an offset plate for transfer to the blanket and then to the paper

D. Offset – In modern lithography, the procedure of transferring a right-reading image (plate cylinder) to an intermediate carrier (blanket cylinder) where it becomes wrong reading, then transferring that image to a receiver (paper stock) where it again becomes right reading

E. Offset press – A piece of printing equipment which holds a roll or stack of paper, controls that paper through the process of imprinting an image on its surface by the offset method, and delivers the paper to a stack or roll for further processing

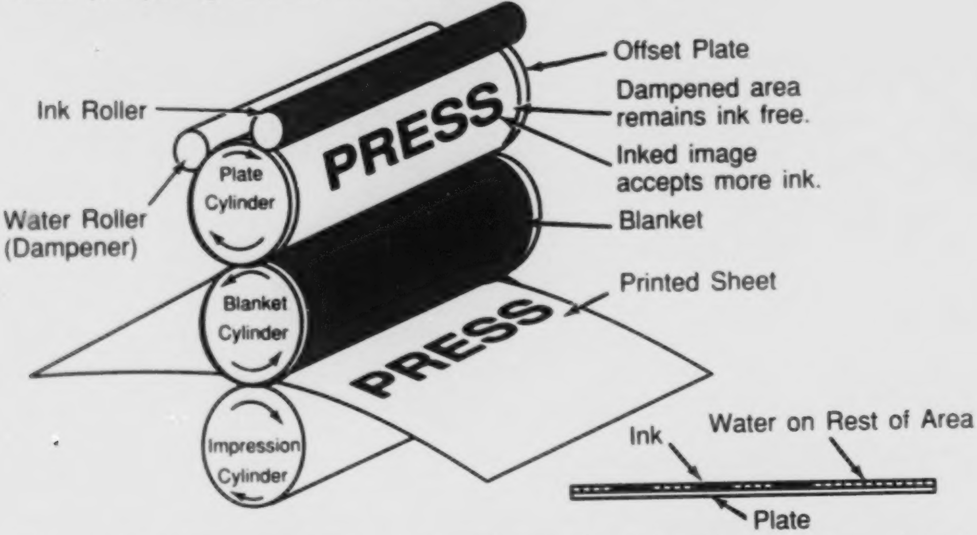
F. Offset printing – The process of printing from a flat surface with the image and nonimage areas separated by water/grease chemistry

G. Register – To print the image in the exact same position on each sheet of paper

H. Register board – A flat surface on which the sheet of paper is positioned between the feeder and cylinder systems

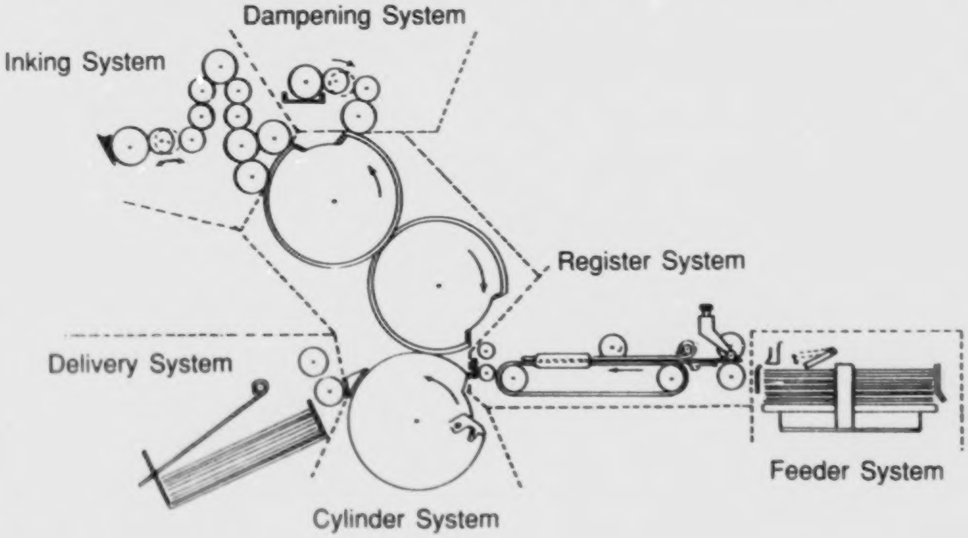
I. Vacuum – Suction created through the sucker tube(s) by a vacuum pump intake

II. **Basic theory of offset printing** — The chemical principle that grease (ink) and water (dampening solution) do not readily mix



(NOTE: If a completed offset plate is dampened evenly with water, the water will be repelled by the greasy inked image — the water will actually run away. If ink is applied to the same plate, the greasy inked image will accept more ink, but the dampened clear area of the plate will remain ink free. If, however, ink is applied to a completed offset plate not previously dampened with water, the entire surface will accept the ink.)

III. **Basic systems of a typical sheet fed offset press** (Transparency 1)



INFORMATION SHEET

IV. Functions of the basic systems of a typical sheet fed offset press

A. Feeder system – Controls the feeding of paper stock either from a roll or as a single sheet from a stack (See illustration on page 6.)

B. Register system – Controls the positioning of the paper being fed through the press so the image will print in the exact same position on each sheet (See illustration on page 6.)

C. Cylinder system – A set of three cylinders (or their equivalent) which control the transfer of the image from the offset plate to the paper being fed through the press (See illustration on page 6.)

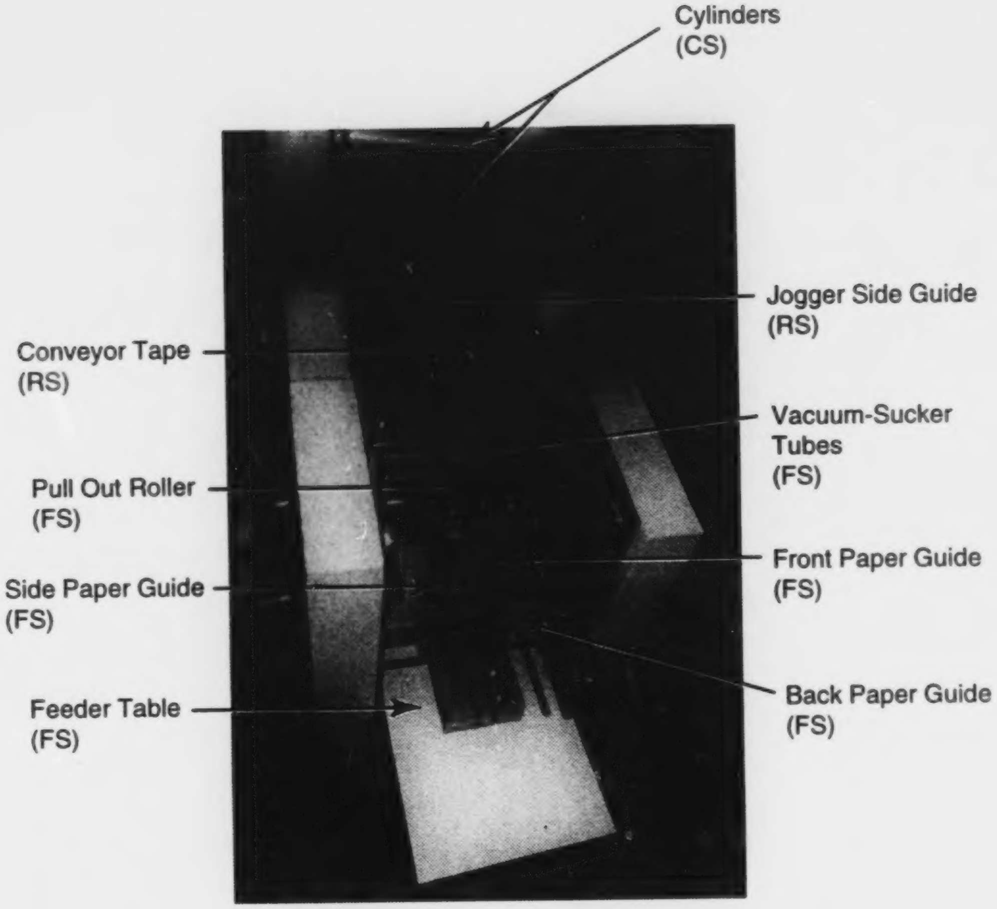
D. Inking system – A reservoir (fountain) of ink and related rollers which control ink distribution to the image areas of the offset plate (See illustrations in Objectives 11-15.)

E. Dampening system – A reservoir (fountain) of dampening solution and related rollers which control dampening solution distribution to the nonimage areas of the offset plate (See illustrations in Objectives 11-15.)

(NOTE: Another name for the dampening system is *water system*.)

F. Delivery system – Controls the paper after the image is printed by stacking to facilitate further processing (See illustrations in Objective 18.)

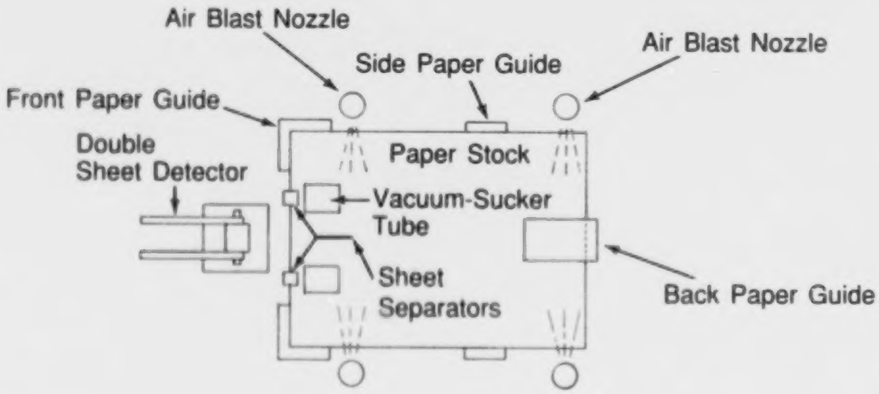
INFORMATION SHEET



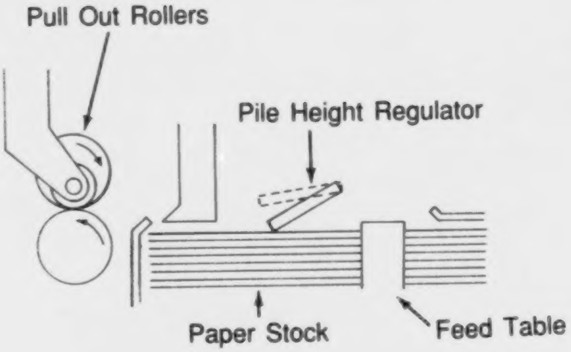
FS - Feeder System
RS - Register System
CS - Cylinder System

INFORMATION SHEET

V. Components of the feeder system of a typical offset press (Transparency 2)



Top View of Feeding System



Side View of Feeder

VI. Functions of components of the feeder system

A. Feed table – Holds a stack or pile of paper in position for feeding into the press

B. Paper guides (front, back, and side) – Position the sheets that are stacked on the feed table by holding the paper on the sides and at the leading and trailing edges in exact position for entering the press

INFORMATION SHEET

C. Double sheet detector — A device which gauges the thickness of the paper before it is fed into the register system and provides a means of stopping or deflecting the paper if two or more sheets are picked up by the sucker tube(s)

D. Sheet separator — Small, thin, narrow, flexible metal finger which is positioned against the leading edge of the paper pile and has the tip end bent to fit over the top of the leading edge about 1/4"; it aids in the feeding of one sheet at a time by separating top sheet from a second or more sheets, which remain on top of the pile

E. Vacuum sucker tube — A moveable tube through which a vacuum pump draws air causing a sheet of paper to be drawn into contact with the tube, which then moves the sheet into the press

F. Air blast nozzle — Blows air from the discharge side of a vacuum pump through one or more tubes into the edges of the top few sheets of paper on the feed table to control sheet separation for pickup of a single sheet by the sucker tube(s)

G. Pull out roller — A free turning roller which rotates in contact with a gear driven roller to pull the sheet of paper from the sucker tube(s) and deliver it to the register system

H. Pile height regulator — A device which automatically controls the height at which the pile of paper will be maintained for continuous feeding into the press

VII. Types of feeder systems

A. Sheet feed — Each sheet is picked up at the gripper edge after the trailing edge of the previous sheet moves past the sucker tubes.

(NOTE: Small table top presses use a friction roller feed system.)

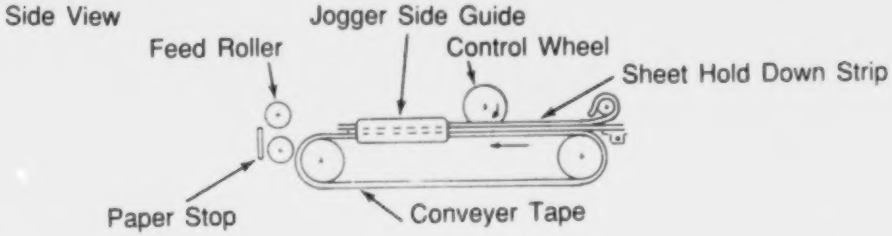
B. Stream feed

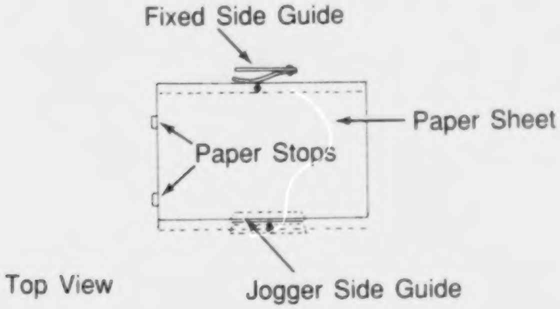
1. Each sheet is picked up at the trailing edge and pushed underneath the previous sheet.
2. Pick up of the next sheet can be made immediately as the trailing edge moves toward the register system.
3. Several overlapping sheets will be in position on the register board at one time.

C. Roll or web feed — The paper is mounted as a roll on the feeder system and can be delivered from the press as single sheets or rewound as a roll.

INFORMATION SHEET

VIII. Components of the register system of a typical offset press (Transparency 3)





IX. Functions of components of the register system

A. Feed roller — A free turning roller which moves in and out of contact with a gear-driven roller during each revolution of the press to move the sheet of paper from its register board position into the cylinder grippers

B. Paper stops — A set of guides to stop the forward motion of the sheet of paper so it may be positioned by the side guides

(NOTE: The paper stops are also called *drop guides.*)

C. Conveyor tapes — A set of tapes or tracks which lie flat on the register board, and rotate around the board to move the paper through the register system

D. Jogger side guide — Positions paper to correctly enter feed roller; adjusts to width of paper

E. Sheet hold down strip — A thin, narrow flexible strip of metal the length of the register board which lies on top of a sheet of paper with a conveyor tape underneath to prevent sheet buckle

F. Control wheel — Adjusts the tension on the sheet hold down strip

G. Fixed side guide — Maintains paper in position to enter feed roller

INFORMATION SHEET

X. Types of register systems used on sheet fed offset presses

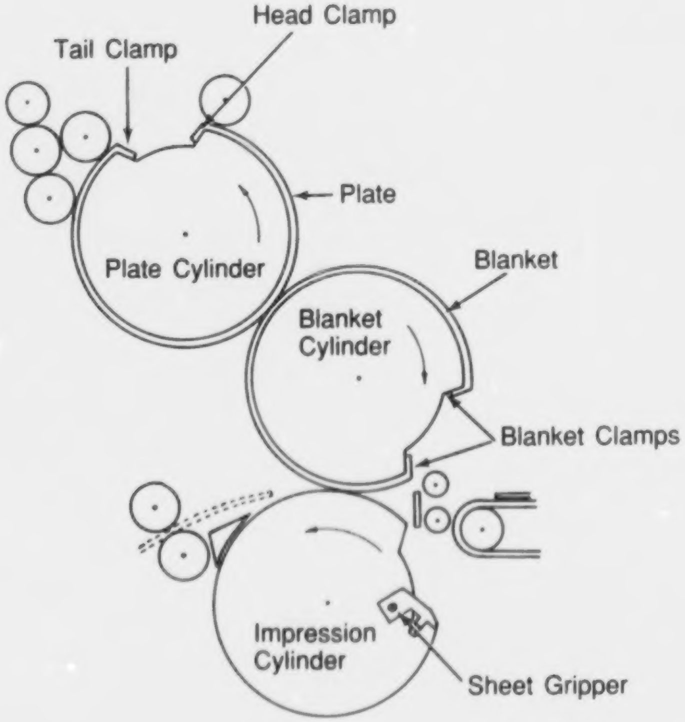
A. Register board

(NOTE: The sheet is positioned by push or pull guides and on some models is delivered to the cylinder system by register swing grippers.)

B. Feeder/buckle

(NOTE: The register is controlled laterally by positioning the sheet on the feed table; vertically, the image register is controlled by adjusting the buckle caused by overfeeding of the sheet into the open cylinder grippers and holding that buckle until the grippers close.)

XI. Components of the cylinder system of a typical offset press (Transparency 4)



INFORMATION SHEET

XII. Functions of components of the cylinder system

A. Plate cylinder – The part of an offset press which holds the offset plate

B. Tail clamp – The part of a plate cylinder which holds the trailing edge of the offset plate to secure its position on the cylinder

(NOTE: The tail clamp is also known as the *trailing edge clamp*.)

C. Head clamp – The part of a plate cylinder which grips with pressure or holds the leading edge of the offset plate to secure its position on the cylinder

D. Plate – Metal image-bearing surface which, treated with dampening solution and ink, imparts a printing image to the blanket roller

E. Blanket clamps – The parts of the blanket cylinder which hold the blanket secure in position and around the cylinder

F. Blanket cylinder – The part of an offset press which contains a rubber blanket to receive the image from the plate

G. Blanket – A thick sheet of rubber laminated to a backing sheet (usually canvas) that fits on the surface of the blanket cylinder

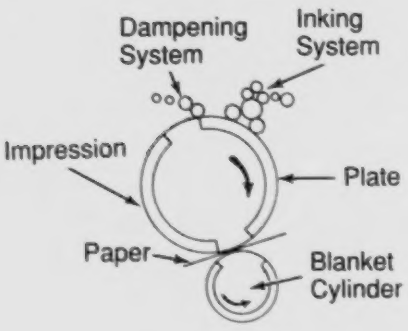
H. Impression cylinder – The part of an offset press which applies pressure for image transfer to the paper

I. Sheet grippers – Several metal fingers attached to a shaft on the impression cylinder which grip the leading edge of the sheet of paper as it passes through the cylinder system

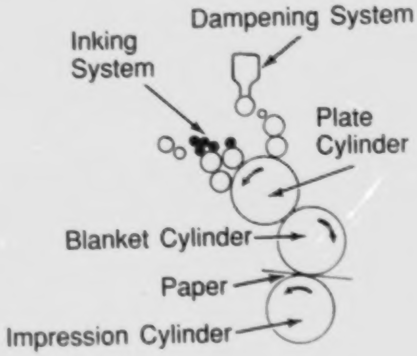
INFORMATION SHEET

XIII. Offset press cylinder arrangements (Transparencies 5 and 6)

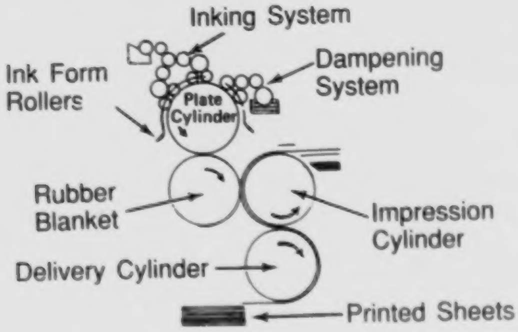
(NOTE: The cylinder systems of offset presses have different arrangements with 2, 3, 4, or more cylinders; the equivalents of the plate, blanket and impression cylinders are present in all arrangements.)



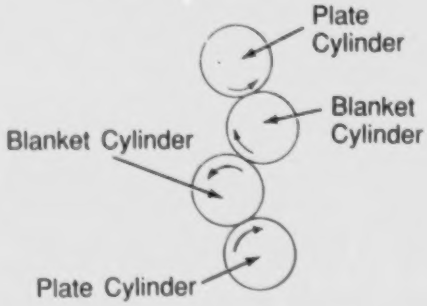
A. Two cylinder



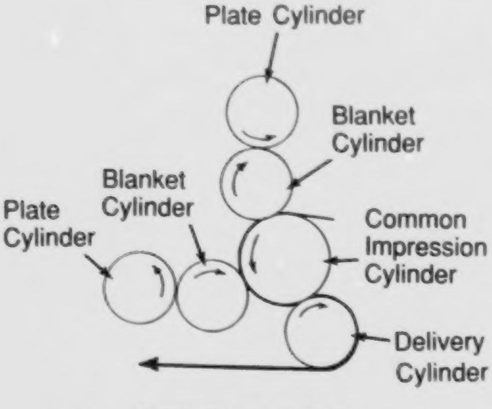
B. Three cylinder



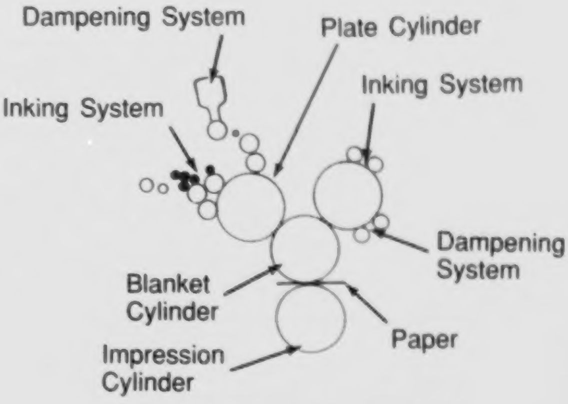
C. Four cylinder



D. Perfector (blanket to blanket)



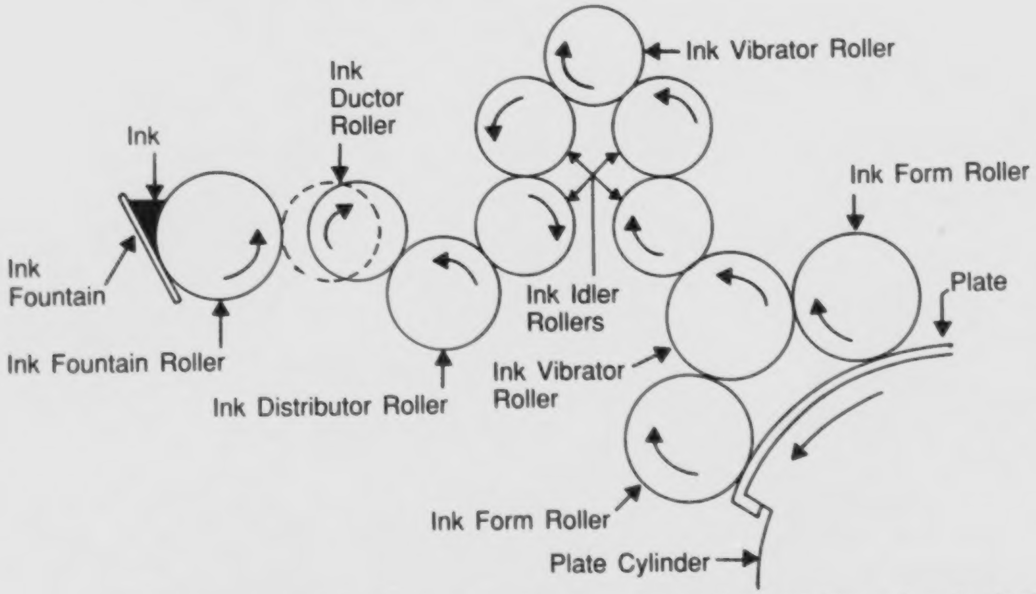
E. Two-color common impression cylinder



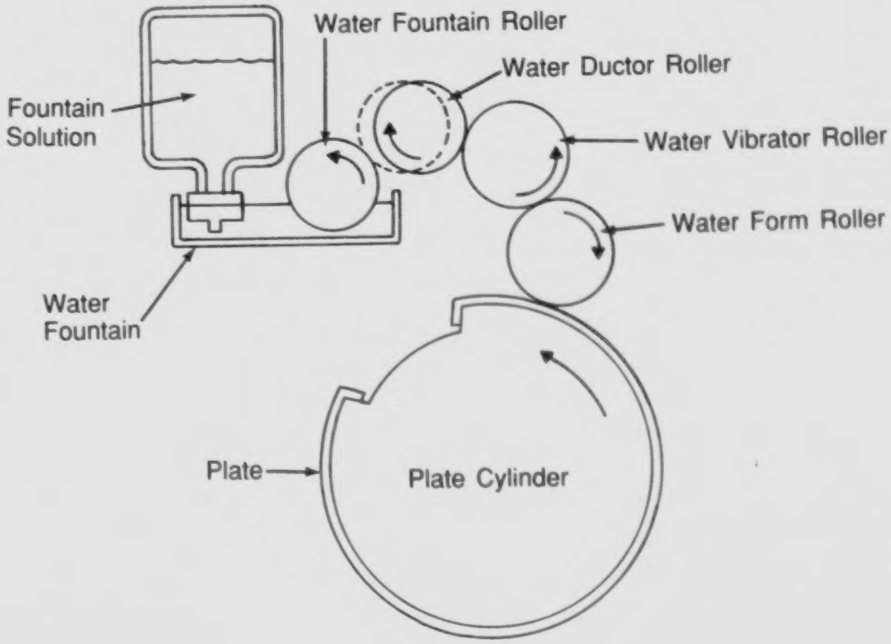
F. Two-color common blanket cylinder

INFORMATION SHEET

XIV. **Components of a conventional inking system of a typical offset press** (Transparency 7)



XV. **Components of a conventional dampening system of a typical offset press** (Transparency 8)



INFORMATION SHEET

XVI. Functions of components of the inking/dampening system

A. Fountain roller — The roller which rotates in the ink and water fountains respectively to distribute ink and water to each of the systems

B. Fountain — A tray reservoir which holds a supply of ink or water (fountain solution)

C. Ductor roller — The intermediate roller which carries ink or water from the respective fountain roller to each system

D. Distributor roller — Gear driven or free turning roller which rotates on its axis in contact with other rollers to aid in even distribution of water and ink in the respective systems

E. Idler roller — A free turning roller which contacts other ink rollers to aid in ink distribution

F. Vibrator roller — A hard surface free-turning (or powered) roller which moves back and forth on its axis while rotating in contact with other rollers in the ink or water system to evenly distribute the ink or water

(NOTE: In various regions of the U.S., the vibrator roller is also called the *oscillating* or *waver roller.*)

G. Form roller — The ink and/or dampening roller which makes contact with the offset plate while it is attached to the plate cylinder

XVII. Types of dampening systems (Transparency 9)

(NOTE: Different press manufacturers use detailed variations to accomplish dampening with these types of systems and call them by trade names such as Dahlgren, Harris-Cottrell, Micro-Flow, Didde-Glaser, A.B. Dick, Aquamatic, and others.)

A. Conventional

1. Separate ink and water fountains
2. Separate ink and water form rollers contacting the plate
3. Covered rollers
    a. Molleton
    b. Parchment
    c. Paper or cloth sleeve
4. Noncovered rollers (barebacks)

INFORMATION SHEET

B. Integrated

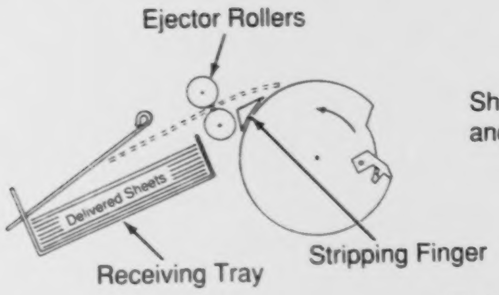
1. Separate ink and water fountains

2. Common ink and water form roller(s) contacting the plate

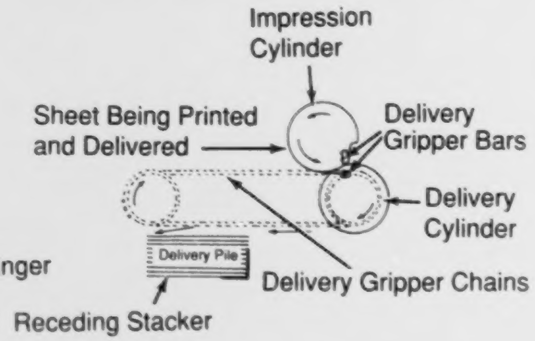
3. Noncovered rollers

(NOTE: Various designs of integrated dampening systems may be encountered in the field depending upon the manufacturer of individual presses. Many appear considerably different in numbers and arrangements of rollers, but all share the above common traits. See Student Supplement 1.)

XVIII. Components of the delivery system of a typical offset press (Transparency 10)



Tray Delivery



Chain Delivery With Receding Stacker

XIX. Functions of components of the delivery system

A. Ejector rollers — Rollers which aid in removing the sheet of paper from the impression cylinder and delivering it to the receiving unit

B. Receiving tray — A tray with positioning guides which receives the sheet from the cylinder system and holds the paper in a straight stack

(NOTE: The quantity capacity of the tray is about 500 sheets of 20-pound bond.)

C. Stripping finger — Metal finger which is positioned close to the surface of the impression cylinder which prevents the sheet of paper from following the cylinder rotation after the sheet is released to the delivery system

D. Delivery gripper bars — A set of gripper fingers mounted on two parallel chains which rotate to pick up the sheet of paper from the cylinder grippers and deliver it to a receiving tray or stacking unit

E. Delivery cylinder — Delivers sheet of paper to stack in receiving tray

INFORMATION SHEET

F. Delivery gripper chains—Revolving chains with mounted gripper bars which transfer the sheet of paper from the cylinder system to a receiving table

G. Receding stacker—A receiving table attached to the offset press which automatically lowers as sheets of paper are delivered to it

XX. Types of delivery systems on a typical sheet fed offset press

A. Tray—Paper is delivered to a receiving tray which must be emptied frequently

(NOTE: Tray delivery is also known as *chute delivery.*)

B. Chute with receding stacker—Paper is delivered and positioned on a table which lowers automatically

C. Chain—Paper is delivered by gripper bars revolving on chains to a table which lowers automatically, allowing many sheets to be stacked

(NOTE: Some small presses with chain delivery systems do not have a receding stacker.)

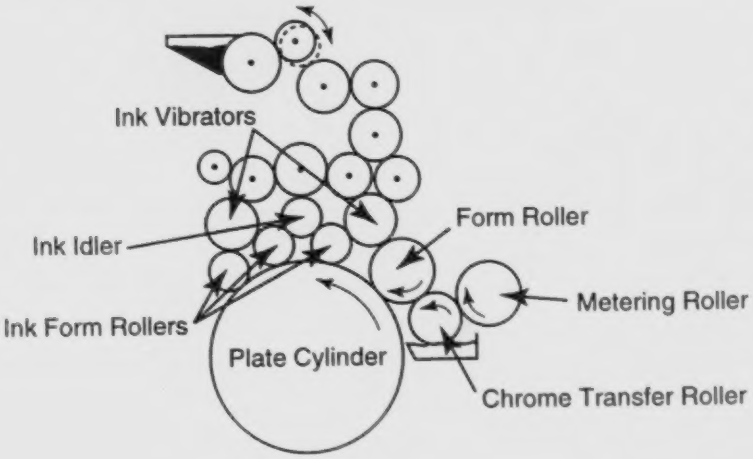
D. Roll or web—Paper fed from a roll is rewound after printing

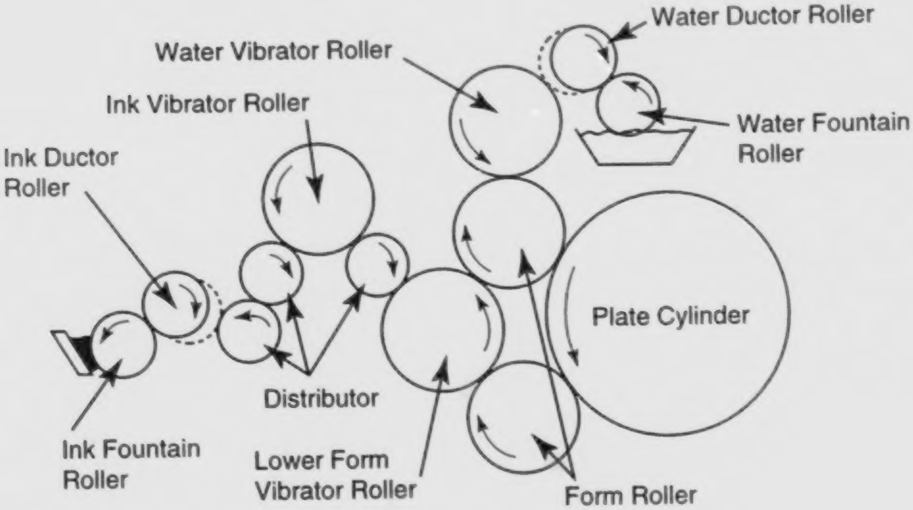
OFFSET PRESS SYSTEMS
UNIT I

STUDENT SUPPLEMENT 1 – INTEGRATED DAMPENING SYSTEMS

As you study Objectives 14 and 15 in this unit, you will notice the inking system and dampening systems are treated as separate systems and are illustrated as "stand alone" schematics. While these systems are, indeed, separate, in reality many offset press designs include shared rollers between the systems, in integrated dampening/inking systems, to save material and manufacturing costs.

So, although you will be studying the systems as separate—for the sake of convenience—compare the following illustrations of integrated systems. You will note they look quite different, however, their function is identical.





OFFSET PRESS SYSTEMS
UNIT I

JOB SHEET #1—TEST BASIC THEORY OF OFFSET PRINTING

Name ______________________________ Attempt Number __________

Evaluation Criteria	Rating
• Student followed directions	_____
• Student thoroughly dampened plate and spread layer of ink on the plate	_____
• Student noted what areas of plate accepted/rejected ink	_____
• Student cleaned and gummed plate	_____
• Student cleaned work area and placed tools and materials in storage	_____

Introduction: The basis of offset printing is the repelling chemical reaction of water and grease. This exercise gives the student personal experience in seeing how ink and dampening solutions react on an exposed printing plate, and how that reaction results in a useable printing tool.

A. Tools and materials

1. Developed offset plate
2. Two cotton pads
3. Small portion of offset press ink
4. Container of fountain solution or water
5. Clean-up solvents
6. Preservatives

B. Procedure

1. Lay plate on table with image up.
2. Thoroughly dampen one cotton pad with fountain solution or water and thoroughly dampen entire surface of offset plate.
3. Dampen remaining cotton pad with ink.
4. Spread an even layer of ink across face of dampened offset plate.

JOB SHEET #1

5. Note what areas of plate accept the ink and what areas remain clear.

____

____

6. Clean and gum plate.

7. Clean work area and return tools and materials to proper storage area.

C. Write a short report using the results of this activity and your knowledge from class notes, lectures, and resource materials.

1. Explain what took place when the ink was applied to the dampened offset plate.

2. Explain what might have happened if the ink had been applied to a dry plate.

3. On a printing job, what might be the result of a malfunctioning dampening system?

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

UNIT OBJECTIVE

After completion of this unit, the student should be able to select ink and mix PMS ink colors for an offset sheet fed press job. Competencies will be demonstrated by completing the assignment sheets, job sheets, and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to offset inks and dampening solutions with their correct definitions.
2. Select true statements concerning the main ingredients of offset inks.
3. Name three ink manufacturing procedures which benefit the user.
4. Match types of ink to their descriptions.
5. List three conditions influencing the printing performance of offset inks.
6. Name three ink properties which affect the printing quality of offset inks.
7. Select rules for ink care and storage.
8. State the purpose of offset dampening solutions.
9. Match dampening solution ingredients with their functions.
10. Name the two methods of measuring pH.
11. State the generally acceptable range of pH for a fountain solution.
12. Select the effects of using alcohol or alcohol substitutes in a fountain solution.
13. Discuss the importance of ink-water balance.
14. Conduct an ink cabinet inventory. (Assignment Sheet #1)
15. Conduct an inventory of offset press dampening chemistry. (Assignment Sheet #2)
16. Mix dampening solution and test for pH. (Job Sheet #1)

SPECIFIC OBJECTIVES

17. Mix PMS colors and conduct and evaluate an ink draw-down or smear. (Job Sheet #2)

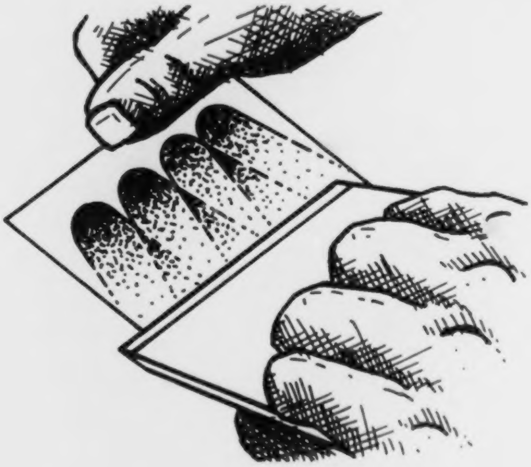
18. Mix two colors of ink to produce a third color. (Job Sheet #3)

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

INFORMATION SHEET

I. **Terms and definitions**

A. Draw-down—A test procedure by which two or more small quantities of ink are placed on a test sheet of paper and spread uniformly with an ink knife or spatula in parallel stripes to determine color strength, opacity and general appearance



(Courtesy Graphic Arts Technical Foundation)

B. Drier—Any substance added to ink to speed drying

C. Extender—A colorless substance mixed with ink to increase its covering power

D. Fugitive—A tendency to lose color or fade when exposed to sunlight for long periods

E. Lakes—Ink body colors which are not particularly strong

F. Length—Ability of ink to flow and form long or short filaments

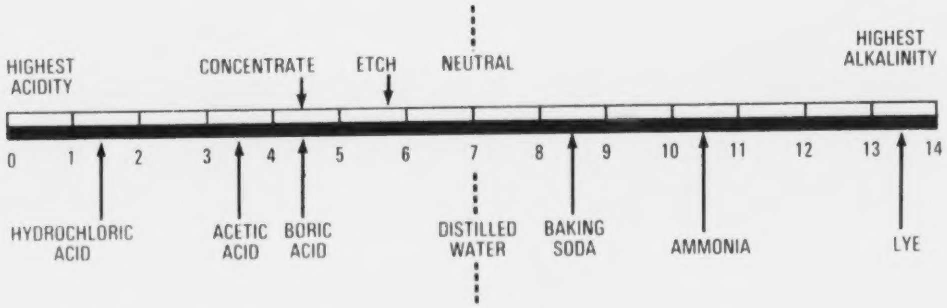
G. Metallic inks—Inks containing finely ground metallic powder, such as aluminum and bronze, which are used to provide silver and gold colors

H. Opacity—The hiding or covering quality of ink

I. Permanence (fastness)—A property of nonfading regardless of exposure to strong light or passage of time

J. pH—A symbol for the strength of acid or alkali in any solution, represented on a scale from 0-14 with 7 as neutral, 0 as acid and 14 as alkaline

INFORMATION SHEET



(Courtesy A. B. Dick)

K. Pigments—The coloring materials in ink

L. PMS (Pantone Matching System)—A standardized, nearly universally accepted matching system for mixing inks to produce given colors

M. Relative humidity—The amount of water vapor in the air compared to the greatest amount possible at the same temperature

N. Resin—Natural organic substance from plants which is not soluble in water

O. Resistant—Manufactured to withstand the action of such factors as gases, chemicals, heat and moisture

P. Tack—The stickiness of the ink

Q. Toners—Strong ink body colors with highly concentrated pigments

R. Translucence—The varying quality of an ink between opacity and transparency

S. Transparency—The characteristic of an ink that allows images beneath it to show through

T. Varnish—A thin, protective coating which is printed like ink on the paper stock; also used as an additive to vary ink properties

U. Vehicle—The bulk of the body of an ink

V. Viscosity—The resistance of ink to flow

W. Water colors—Colors which produce flat effects

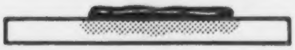
(NOTE: Water colors contain no varnish.)

INFORMATION SHEET

II. Main ingredients of offset inks

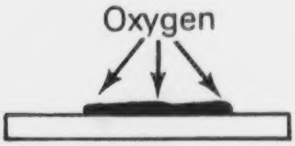
A. Vehicle – Forms the bulk of the body of ink; carries the pigment and binds the ink to the material being printed

1. Types of vehicles
    - a. Varnish (linseed oil)
    - b. Synthetic oils (dehydrated castor oil, epoxy oil, alkyd oil)
    - c. Resins
    - d. Solvents (petroleum or vegetable oil-based compounds)
2. Factors determining vehicle selection
    - a. Purpose of ink
    - b. Printing process being used
    - c. Kind of paper
    - d. Methods of ink drying (Transparency 1)
        - Absorption



Nondrying oils penetrate the paper and dry as they are absorbed

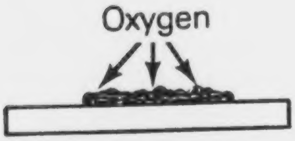
- Oxidation



The vehicle absorbs oxygen from the air and becomes solid

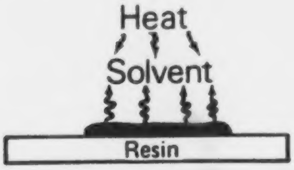
INFORMATION SHEET

- Polymerization



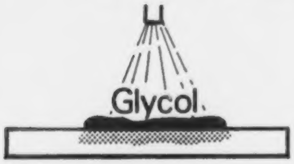
Oxygen sets up a reaction that causes molecules to form a gel, then large molecular chains that harden

- Resin-solvent (evaporation)



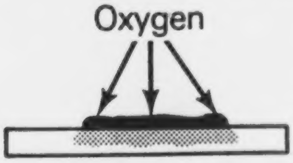
The combination resin-solvent vehicle releases the solvent causing the resin to dry; process can be speeded by heating

- Moisture-set (precipitation)



A glycol-resin vehicle is sprayed with water or steam; glycol mixes with water and is absorbed by the paper and the resin precipitates as a solid film

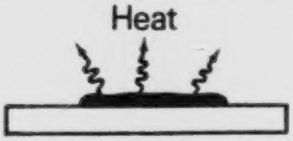
- Resin-oil (absorption and oxidation)



A combination of absorption and oxidation provides quick setting

INFORMATION SHEET

- Coldset (cooling)



A wax and resin vehicle is heated, then becomes solid as heat is radiated away from the vehicle as it cools

B. Pigments – The coloring materials

1. Black pigments are primarily carbon produced by burning petroleum products.

2. White pigments

    a. Opaque white are used as colorants.

    b. Transparent white are used as extenders.

3. Colored pigments are mostly synthetic; produced by processing chemicals to make dyes.

    (NOTE: Colors that fade in sunlight are called fugitive. Colors that resist fading are said to have permanence. Colors that withstand the action of gases, chemicals, heat and moisture are called resistant.)

C. Modifiers – Driers, waxes, lubricants, gums, starches, extenders, varnishes and/or wetting agents which affect the drying of ink.

(NOTE: Small amounts of one or more modifiers may be added by a press operator in order for the ink to work and dry properly under existing production conditions. Compounds [and their use] for this purpose should be recommended by the manufacturer of the specific ink, however.)

1. Greases aid in ink setting and ink lubrication.

2. Thin oils and solvents reduce tack.

3. Wetting agents help the vehicle to cover the pigment particles.

4. Antioxidants slow surface drying.

5. Deodorants eliminate odors of oils and driers.

6. Perfumes impart fragrance to ink.

INFORMATION SHEET

III. Ink manufacturing procedures which benefit the user

(NOTE: Inks are manufactured with specific characteristics for each printing process. Offset inks are made specifically for use on offset presses. These inks must withstand constant contact with dampening solution without emulsifying [breaking down in water]; thus, letterpress inks should never be used on an offset press.)

A. Ink is mixed in batches and carefully weighed.

(NOTE: The mixing equipment is cleaned thoroughly after each batch and the process begins all over again. Records are kept on lists of ingredients and batch numbers. Any problem with ink at the press can be solved more quickly by the manufacturer if the batch number is known. Many times in troubleshooting, a press problem may be distinguished from an ink problem by use of ink from a different batch.)

B. Ink is tested at the factory under actual printing conditions.

C. Packaging varies for convenient use and storage.

(Note: Ink is sold and stored in tubes, cans, drums, tank trucks, and railroad tank cars.)

IV. Types of ink

A. Heat-set inks – Used on high speed presses with heating devices

B. Quick-set inks – Dry by penetration and oxidation

C. Gloss inks – Exhibit minimum penetration into paper surface

D. News inks – Dry by absorption on high speed presses

E. Metallic inks – Contain metal powders suspended in a vehicle

F. Magnetic inks – Contain iron-bearing pigments which can be magnetized

G. Process inks – Have special colors (magenta, cyan, yellow), transparency, and drying characteristics

(NOTE: In four-color press work, inks and their drying characteristics have to be selected on the basis of the order in which they are placed on the paper.)

H. Rubber base inks – Dry quickly on most stock, but dry slowly on ink rollers

INFORMATION SHEET

V. **Conditions influencing the printing performance of offset inks**

   A. Type of press being used

   B. Speed of press

   C. Stock surface being printed

VI. **Ink properties which affect the printing quality of offset inks**

   A. Color (pigments)

   (NOTE: Mass-tone refers to ink color, undertone is the background color, tinting strength is the color intensity, and opacity or transparency is the ability to cover. Since inks are never completely opaque or transparent, they appear in varying degrees of translucency.)

   B. Body (consistency, viscosity)

   C. Ability to dry (absorption, evaporation, oxidation)

VII. **Rules for ink care and storage**

   A. Do not reuse ink after removal from ink fountain.

   B. Keep ink surface level when removing ink from can.

   C. Keep covers on all containers when not in use.

   D. Store inks in enclosed metal cabinet away from excessive temperatures and light.

   E. Keep outside surfaces of cans and tubes free of ink spills, smears, and stains.

   F. Observe shelf life recommendations of manufacturer.

   (NOTE: Mixing colors of inks requires special tools and attention if colors are to be specific and repeatable. The Pantone Matching System [PMS] is nearly universally accepted and achieves these goals. To mix ink at the press with any predictability and without a mixing system requires some knowledge of the results of mixing primary colors to achieve another color or get a lighter or darker shade or tint. For best results only ink manufactured for mixing should be used. Generally, stronger colors [toners] should be added to weaker colors [lakes]. Mixing should be done on a hard, smooth surface using an ink knife or spatula to blend colors.)

INFORMATION SHEET

VIII. The purpose of offset dampening solutions—To keep the nonimage area of a well-processed offset plate clean

IX. Dampening solution ingredients and their functions

A. Water—The main ingredient which provides the moisture to keep the nonimage areas clean

(NOTE: The desensitized film which holds water on the nonimage areas of the plate usually breaks down or wears off gradually. Water alone will not rebuild the desensitized film, so chemicals are added to the water.)

B. Gum—The main desensitizing agent in the fountain solution; absorbed to the nonimage areas where it replaces the water-holding desensitized film worn off the plate during the press run

(NOTE: The gum is usually gum arabic or cellulose gum.)

C. Acid—Improves the adherence of the gum to the nonimage area of the plate

(NOTE: Generally a pH between 4.0 and 5.0 is satisfactory. Increasing the acid does not keep the nonprinting area clean, but it tends to break down color of ink, causes ink to emulsify, causes ink roller stripping, retards ink drying and reduces the life of the plate image.)

D. Chemical salts (ammonium dichromate)—Keep the acid in the fountain solution from reacting chemically with the metal of the plate and prevent stripping of the metal ink rollers

E. Buffers (nitrate salts)—Stabilize the pH of a fountain solution

(NOTE: It is important that the solution contain the *minimum* amount of gum and acid needed to keep the plate running clean.)

F. Premixed solutions—Fountain solution chemicals premixed and packaged by manufacturers for specific presses and printing projects

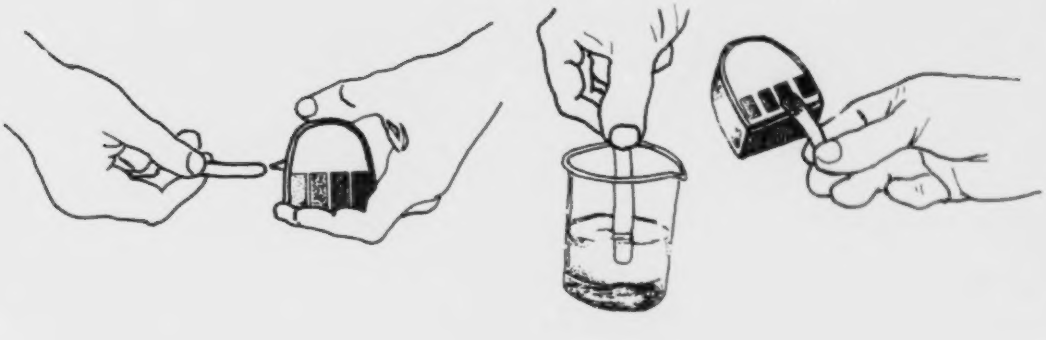
(NOTE: Consult your press operator's manual before purchasing or using these products.)

X. Methods of measuring pH (acidity or alkalinity)

A. pH paper test strips

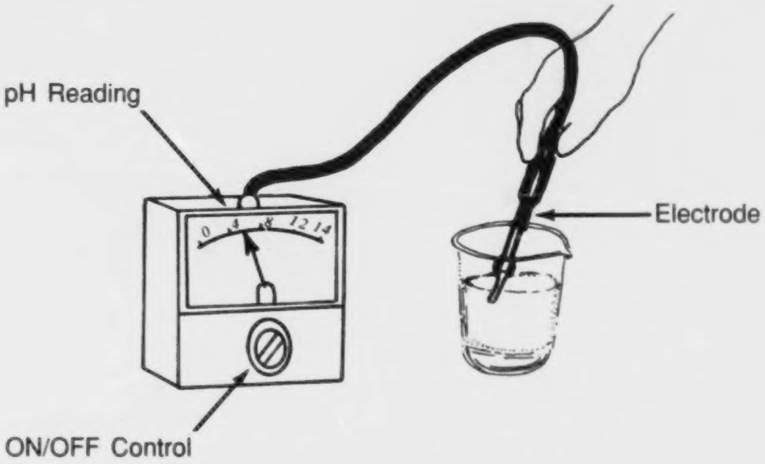
(NOTE: Test strips are impregnated with organic chemical compounds which change color when immersed in a solution. The color change is compared with a pH color chart which gives the pH value. These strips and color charts are available from a number of manufacturers.)

INFORMATION SHEET



B. Electronic pH meter

(NOTE: An electronic meter gives a pH reading by a pointer on a scale or by a digital readout when the electrode is immersed in a solution.)



XI. **Generally acceptable pH range for a fountain solution**—Depends on the ink and paper being used; generally, a solution with a pH between 4.0 and 5.0 is satisfactory

(NOTE: Check pH of the fountain solution periodically.)

XII. **Effects of using alcohol or alcohol substitutes in a fountain solution**

(NOTE: Although many manuals and press operators continue to concern themselves with isopropyl alcohol in fountain solutions, the industry is rapidly moving away from its use because of increasingly stringent rules and regulations from the Occupational Safety and Health Administration and other government agencies. Because of the movement of the industry to alcohol substitutes, this manual will address itself to such preparations' effects on fountain solutions, but the student is advised to be aware of the fact that alcohol is disappearing from the press room.)

INFORMATION SHEET

- A. Thinner film of solution on plate
- B. Less solution on plate
    - 1. Less dimensional change in sheet
    - 2. Ink drying usually faster
- C. Reduces droplet formation in ink

    (NOTE: "Snowflaky" problems are minimized.)
- D. Better definition between printing and nonprinting areas
- E. Balanced ink-water running condition achieved more rapidly

XIII. Importance of ink-water balance

- A. Key to quality printing
- B. The basic rule for proper adjustment of ink-water balance is to run the minimum amount of ink which will give full color to the job and the minimum amount of water to keep the plate clean

    (NOTE: Water and ink balance through a press run is one of the most important skills a press operator can possess. The proper knowledge and ability in this area will overcome the temptation to resort to fountain solution additives, excessive spray powder on the delivery system, etc., to produce quality results.)
- C. Should be controlled to meet the needs of the plate
- D. Proper control demands accurate analysis of problems as they occur

    (NOTE: Some symptoms at first appear the same even though they come from different causes. If the operator is knowledgeable enough to maintain the proper ink-water balance, troubleshooting can begin outside the ink and dampening system.)
- E. Excessive water causes problems
    - 1. Water collecting at trailing edge of plate or blanket
    - 2. Wash marks in solids extending back from the leading edge of a plate
    - 3. "Snowflaky" printing
    - 4. Emulsification of ink and water on roller plate or blanket
- F. Insufficient water causes problems
    - 1. Closing up of shadow dots in halftones (plugging)

INFORMATION SHEET

2. Depositing of ink in nonimage areas of plate (catch-up or scumming)

   (NOTE: For best results with any chemistry in the press room, name brand products should be matched and manufacturers' recommendations followed. Stock fountain concentrates usually work well when mixed as specified, but no assumptions should be made for trouble free operations.)

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

ASSIGNMENT SHEET #1—CONDUCT AN INK CABINET INVENTORY

Name ________________________________ Overall Rating _____

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Student provided list of inks and additives in the storage area, complete with brand names and colors	_____

Introduction: A knowledge of what inks and additives are available is mandatory for printers meeting demands of customers. This exercise gives the student experience in conducting an inventory of the school shop ink cabinet.

Directions: Make an inventory list of all inks and additives in the ink storage area of your school print shop.

1. Divide the list by name brands.
2. Divide the name brand lists by color.
3. List ink additives separately.
4. To the right of each additive listed, describe its use (see instructor if necessary).
5. Turn in results to your instructor.

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

ASSIGNMENT SHEET #2—CONDUCT AN INVENTORY OF OFFSET PRESS DAMPENING CHEMISTRY

Name ______________________________ Overall Rating _____

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Student provided list of all chemicals used to prepare fountain solution in the shop	_____

Introduction: This exercise gives the student experience in conducting an inventory of the school shop for chemicals used to prepare fountain solutions for shop presses.

Directions: make an inventory list of all chemicals used to prepare fountain solution for all presses in the shop.

1. To the right of each chemical name, write the purpose of the chemical.
2. List the different mixing ratios used for each chemical if applicable (see instructor if necessary).

   EXAMPLES: 1:30, 1:15, 1:7
3. Turn in results to your instructor.

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

JOB SHEET #1—MIX DAMPENING SOLUTION AND TEST FOR pH

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Fountain solution properly mixed	_____
• pH value determined and accurately noted	_____

Introduction: The basis of offset printing is the repelling chemical reaction of water and grease. This exercise gives the student personal experience in mixing a properly pH balanced fountain solution for use on the school press.

A. Tools and materials

1. Premixed fountain solution ingredients (or ingredients for mixing prescribed fountain solution) and containers for mixing (provided by instructor)
2. Distilled or deionized water (provided by instructor)
3. pH testing strips or electronic pH meter
4. Paper to record results
5. Pencil or pen

B. Procedure

1. Mix fountain solution ingredients and distilled or deionized water according to manufacturer's or instructor's directions.
2. Insert test strips (Figure 1) or meter electrode (Figure 2) into mixed solution.

FIGURE 1

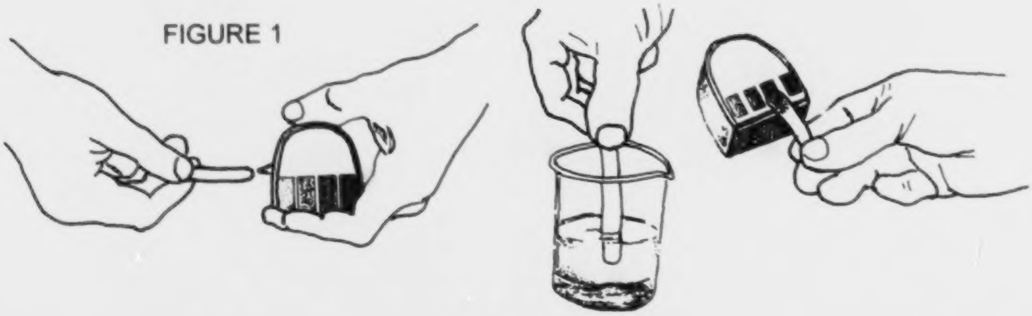
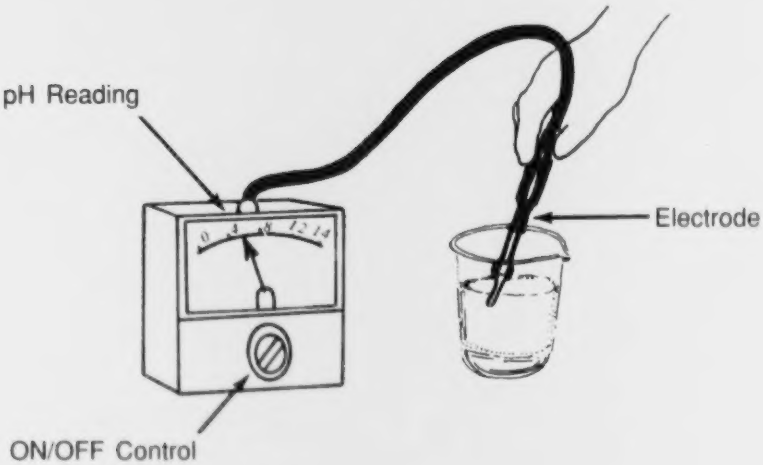


FIGURE 2



3. Determine pH by comparing the test strips to pH chart or reading meter.
4. Record the pH value.
5. Turn in results to instructor.
6. Clean containers, mixing area and tools.

OFFSET INKS AND DAMPENING CHEMISTRY

UNIT II

JOB SHEET #2—MIX PMS COLORS; CONDUCT AND EVALUATE AN INK DRAW-DOWN OR SMEAR

Name ______________________________ Attempt Number __________

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Correct ink samples accurately weighed and blended	_____
• Samples carefully placed and draw-down completed in one stroke	_____
• Sample colors compared to factory sample	_____

Introduction: This exercise gives the student experience in accurately blending inks to match a desired color.

A. Tools and materials

1. PMS color formula guide
2. Sufficient quantities of Pantone Yellow C basic color ink, Pantone Transparent White ink, and Pantone 101C ink for activity (provided by instructor)
3. Draw-down paper strips with opaque strip (provided by instructor)
4. Ink knife or spatula
5. Mixing containers
6. Ink scale
7. Pencil or pen

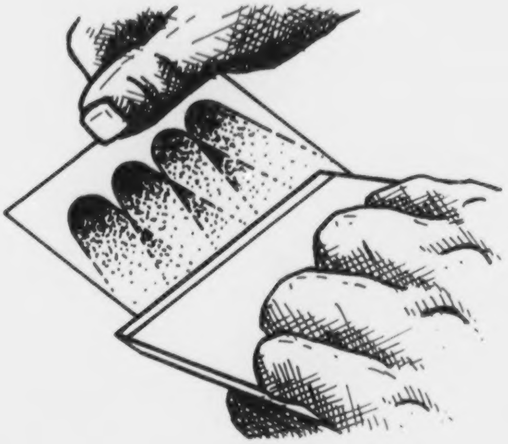
JOB SHEET #2

B. Procedure

1. Weigh proper quantities of Pantone Yellow C and Pantone Transparent White ink (according to weight measures of scale and color formula guide ratios for Pantone 101C) and mix thoroughly (to the satisfaction of the instructor).

2. Using spatula or ink knife, deposit a small quantity of Pantone 101C near the top of a draw-down strip (Figure 1).

FIGURE 1



3. Clean the tool thoroughly.

4. Using the same technique, deposit a like-size quantity of the mixture of Pantone Yellow C and Pantone Transparent White ink adjacent to the Pantone 101C sample on the draw-down strip.

5. Clean the tool thoroughly.

6. Using the spatula or ink knife, in one stroke, draw both samples down across the opaque strip of the draw-down sheet until the ink is dissipated.

7. Compare the factory-produced 101C with the classroom mixed example of 101C for color strength, opacity, and general appearance on the paper surface of the draw-down strip.

8. Sign name to draw-down sheet and turn in completed project to instructor.

9. Clean containers, mixing area, and tools.

OFFSET INKS AND DAMPENING CHEMISTRY
UNIT II

JOB SHEET #3—MIX TWO COLORS OF INK TO PRODUCE A THIRD COLOR

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Pantone Yellow C and Pantone Process Blue C inks accurately weighed and mixed	_____
• Draw-down completed and compared to Pantone 368C	_____

Introduction: This exercise gives the student experience in accurately blending inks to match a desired color.

A. Tools and materials

1. PMS color formula guide
2. Sufficient quantities of Pantone Yellow C ink and Pantone Process Blue C ink for activity (provided by instructor)
3. Ink knife or spatula
4. Mixing containers and tools
5. Draw-down paper strips
6. Ink scale

B. Procedure

1. Weigh proper quantities of Pantone Yellow C ink and Pantone Process Blue C ink (according to weight measure of scale and color formula guide ratios for Pantone 368C – a green).
2. Using mixing tools, mix the two inks thoroughly (to the instructor's satisfaction).
3. Conduct an ink draw-down with the mixture.
4. Compare the results with the example of Pantone 368C in the color formula guide.

JOB SHEET 3

5. Discuss results with instructor.
6. Clean mixing area, containers and tools.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

UNIT OBJECTIVE

After completion of this unit, the student should be able to set up sheet and image control systems of an offset press and print a number of printing assignments. Competencies will be demonstrated by completing assignment sheets, job sheets, and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit the student should be able to:

1. Match terms related to offset press operating procedures with their correct definitions.
2. Select true statements concerning essential safety precautions.
3. List two reasons why efficient press operation is important.
4. Select offset press operator control functions.
5. Match typical operator control features with the press systems in which they are located.
6. Arrange in order steps in the sequence of paper movement through a typical offset press.
7. Compare control features of offset presses. (Assignment Sheet #1)
8. Set up the sheet control systems. (Job Sheet #1)
9. Set up the image control systems. (Job Sheet #2)
10. Operate an offset press from setup of systems through printed sheet delivery. (Job Sheet #3)
11. Perform a color wash on an offset press. (Job Sheet #4)
12. Print envelopes. (Job Sheet #5)
13. Change press from envelopes to letterhead. (Job Sheet #6)
14. Print a two-color job. (Job Sheet #7)
15. Print a work-and-turn. (Job Sheet #8)

OBJECTIVE SHEET

16. Print halftones and screen tints. (Job Sheet #9)
17. Print solids. (Job Sheet #10)
18. Perform perforation and scoring. (Job Sheet #11)

OFFSET PRESS OPERATING PROCEDURES
UNIT III

INFORMATION SHEET

(NOTE: This unit is developed on the premise that all types of offset presses possess the same basic systems which serve the same basic functions, have the same basic controls and produce the same basic end product; therefore, the basic operation procedures are similar for all types of offset presses.)

I. **Terms and definitions**

A. Blanket wash—A petroleum base solvent prepared for washing rubber offset blankets and rollers; used for general press clean up

B. Etch—A solution that conditions the nonimage area of an offset plate to make it more water receptive

C. Feed table extensions—Moveable metal plates which attach at right angles to the feed table surface to extend its height and allow open space to accommodate the side and back paper guides when the feed table is at top position

D. Handwheel—A wheel on the operator's side of a press which allows the operator to turn the press through its cycle by hand

E. Night latch—A position of slight separation of the rollers in the ink and dampening systems used when the press is not operated for a period of time to prevent flat stripes from forming on roller surfaces

F. Paper bail—A thin, narrow, long metal strip attached to the delivery system which aids in controlling the delivery of a sheet to the receiving tray

G. Setoff—A condition caused by wet ink from the image on the surface of one sheet rubbing off onto the next sheet in contact with the image

II. **Essential safety precautions**

A. Tie back long hair.

B. Avoid or bind up loose clothing.

C. Remove jewelry such as bracelets, watches, rings, and necklaces before operating a press.

D. Keep dust cover and safety guards in place for operation.

E. Stop the press when:

1. Using tools for adjustments.

(NOTE: Always remove tools from press.)

    2. Making hand adjustments on moving parts.

    3. Wiping or cleaning with a rag.

    4. Lubricating any part.

    5. Clearing paper jams.

    6. Leaving press area.

F. Limit use of press to one designated operator at any one time.

G. Receive specific permission or assignment before press is operated.

H. Fold rags for cleaning rather than wadding in hand.

I. Place dirty rags in a metal container.

J. Read operator's manual before operating press.

K. Keep press work area free of trash and clutter.

L. Inspect and turn press with the handwheel at least one revolution before starting drive motor.

M. Make sure electrical connections are in full contact and free of frayed or broken insulation.

N. Ventilate fumes from the press area.

O. Store flammable liquids in designated, protected area.

III. Reasons why efficient press operation is important

A. No income is received unless printed sheets are delivered from the press.

B. Reduced profit potential results from inefficient use of time, equipment, and materials.

IV. Offset press operator control functions

A. Control paper

    1. Feed

    2. Register

    3. Deliver

B. Control ink to plate image area

C. Control dampening solution to plate nonimage area

INFORMATION SHEET

D. Control image transfer quality

    1. Plate to blanket

    2. Blanket to paper

E. Control press wash-up

F. Maintain safe and orderly work area

G. Complete job order records for press operation

V. Typical operator control features of offset press systems

A. Feeder system

    1. Feed table raise/lower crank

    2. Paper feed guides

    3. Stack height regulator

    4. Vacuum control

    5. Air blast (blower) control

    6. Sheet separators

    7. Pull-out roller pressure

    8. Double sheet detector

B. Register system

    1. Sheet control wheels

    2. Sheet hold down strips

    3. Side register guides (including jogger)

    4. Paper stops

    5. Feed roller pressure

    6. Feed roller timing

C. Cylinder system

    1. Handwheel

    2. Plate position

    3. Plate to blanket pressure

    4. Blanket to impression cylinder pressure

    5. Vertical image position

D. Dampening system

    1. Fountain solution (mixing)

    2. Water feed control lever

    3. Water form roller on/off control

    4. Water ductor roller on/off control

    (NOTE: Some small presses feature a single lever control which allows the operator to contact water rollers to plate, contact ink rollers to plate, transfer image to the blanket cylinder and start feeder system with the movement of one lever.)

E. Inking system

    1. Ink fountain adjusting screws

    2. Ink feed lever

    3. Ink form roller on/off control

    4. Ink ductor roller on/off control

F. Delivery system

    1. Ejector unit for tray and receding stacker

        a. Rollers

        b. Rings

    2. Paper turning wheels for chain delivery

    3. Stacker raise/lower crank

    4. Stacker lowering speed control

    5. Paper delivery guides (including jogger)

VI. **Sequence of paper movement through a typical offset press** (Transparency 1)

A. Paper is placed on feed table.

B. Feed table raises automatically.

INFORMATION SHEET

C. Sheet separators and air blowers separate sheets.

D. Sucker tube lifts paper, moving it to pullout rollers.

E. Pullout rollers move sheet to register board.

F. Double sheet detector prevents more than one sheet from going to register system at a time.

G. Several moving tapes carry paper along register board.

H. Balls and metal strips hold paper down on tapes.

I. Stop fingers move up and down to halt sheet for register to side position and for timing of feed into cylinder grippers.

J. Feed rollers move sheet into cylinder grippers.

K. Cylinder grippers grip sheet and guide it between impression and blanket cylinders.

L. Image transfers to paper from blanket by pressure from the impression cylinder.

M. After holding the sheet for less than one revolution, the cylinder grippers open.

N. Strippers separate the paper from the impression cylinder.

(NOTE: On chain delivery systems the paper is transferred from cylinder grippers to chain grippers at this point.)

O. Ejector wheels guide the paper into receiving tray or stacker.

P. Receiving tray or table (jogger) holds finished sheets.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

ASSIGNMENT SHEET #1—COMPARE CONTROL FEATURES OF OFFSET PRESSES

Name ______________________ Overall rating ____________

Evaluation Criteria	**Rating**
• Directions have been followed	______
• List properly matches presses examined	______

Directions: Compare the control features of several small presses. Go to school shop area, visit printing firms or departments, or use the pictures of the small presses included with this assignment.

1. Make a list of similar control features found on all presses compared.

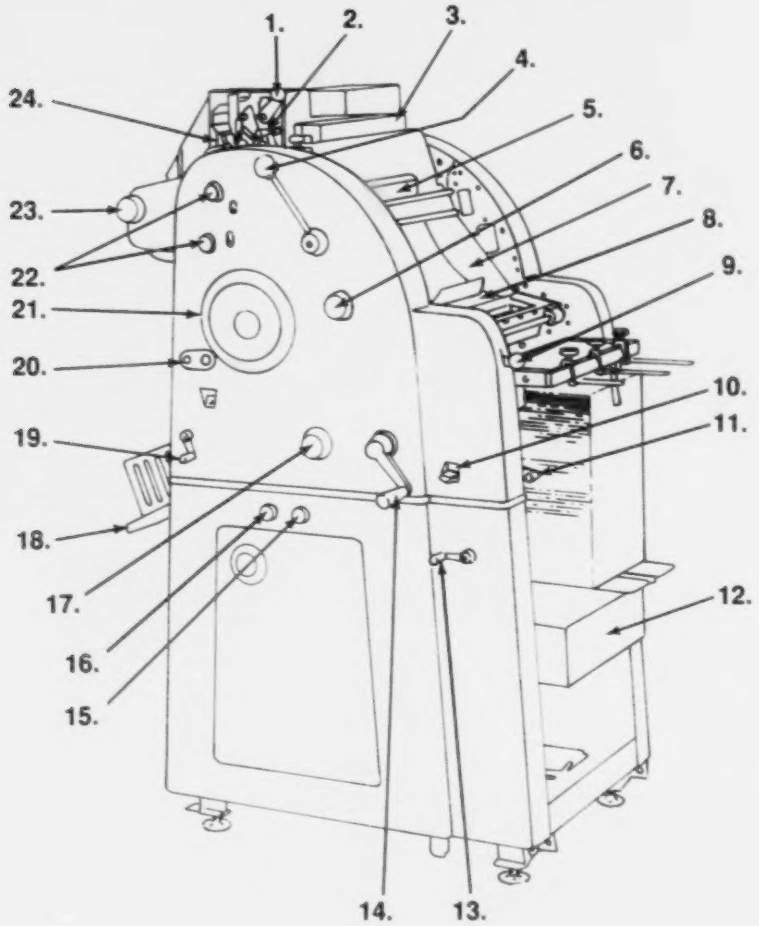
   (NOTE: Manufacturers sometimes apply different names for similar features.)

2. List control features that are unique to each press.

3. Turn the lists in to the instructor.

ASSIGNMENT SHEET #1

A. B. Dick Model 360

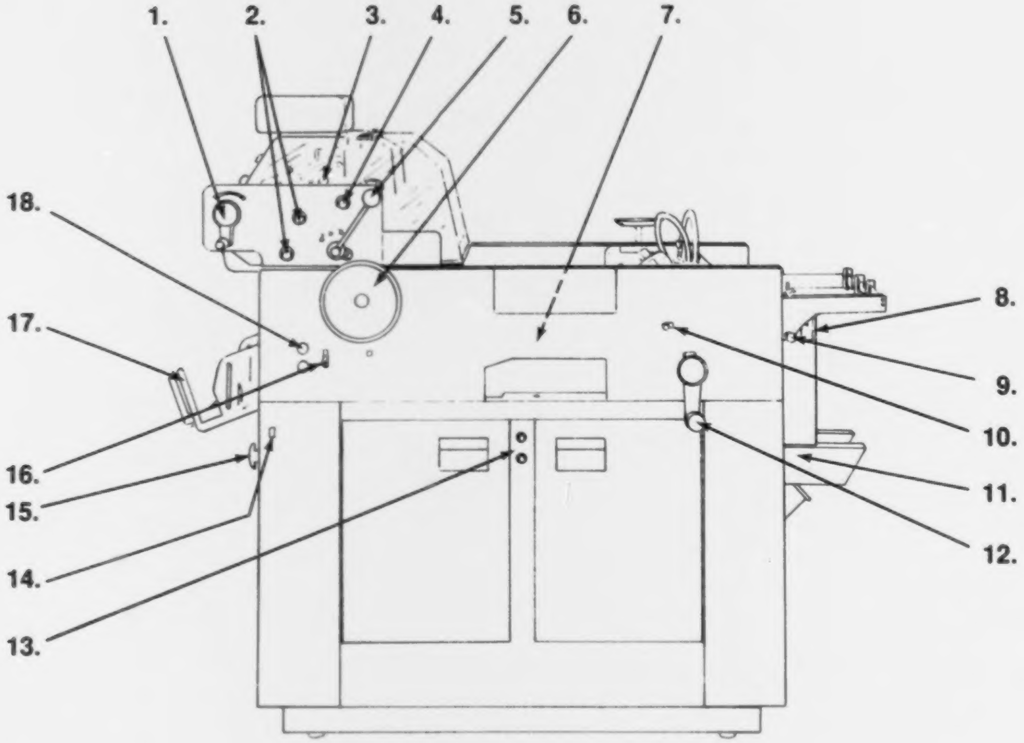


1. Aquamatic Night Latch Handle
2. Aquamatic Control
3. Fountain Solution Trough
4. Operation Control Lever
5. Master Cylinder
6. Vertical Copy Adjusting Lock
7. Blanket Cylinder
8. Copy Counter
9. Paper Feed Lever
10. Table Release
11. Paper Stack Height Adjustment
12. Feed Table
13. Paper Guide Crank
14. Paper Elevator Crank
15. Vacuum Control
16. Air Control
17. Buckle Control
18. Receiving Tray
19. Speed Control
20. Motor Drive and Vacuum Pump Switches
21. Handwheel
22. Form Roller Control Knobs
23. Ink Fountain Roller Knob
24. Aquamatic Lock-Out Latch

(Courtesy A.B. Dick)

ASSIGNMENT SHEET #1

AM Multigraphics® Model 1250



1. Ink Fountain Roller Crank
2. Ink Form Roller Knobs
3. Moisture Fountain Roller Knob
4. Moisture Form Roller Knob
5. Single Lever Control
6. Handwheel
7. Register Board
8. Automatic Paper Feeder
9. Paper Guide Release Lever
10. Elevator Crank Release Lever
11. Vertical Side Guide Locking Lever
12. Elevator Crank
13. Vacuum and Blower Controls
14. Operating Speed Indicator
15. Speed Control Knob
16. Pump Motor On/Off Switch
17. Copy Receiver
18. Machine Start/Stop

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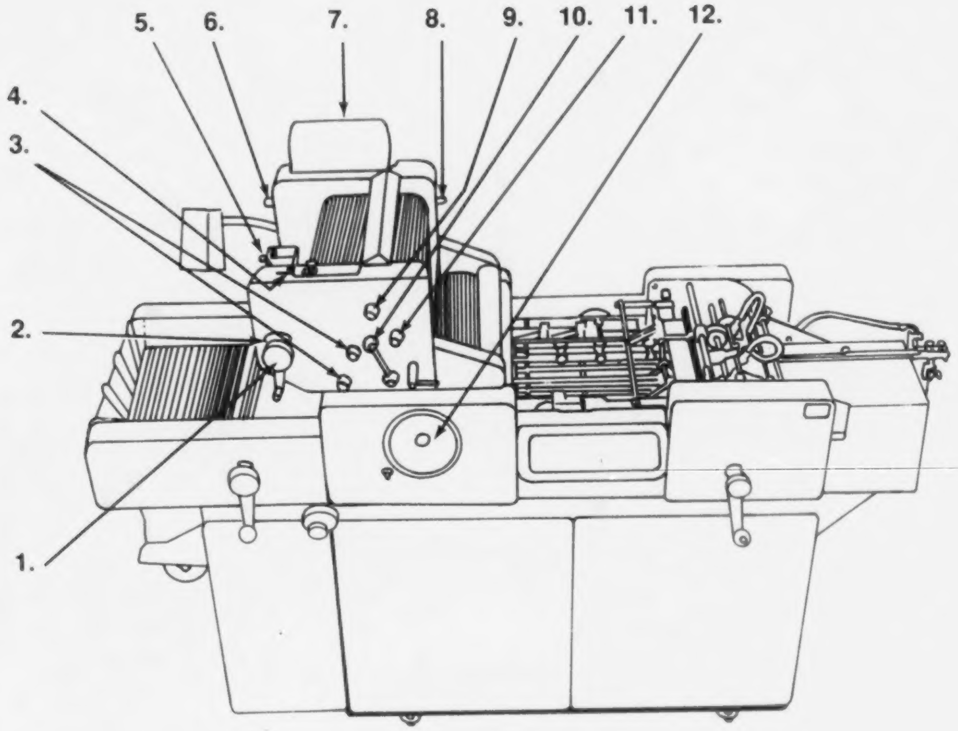
ASSIGNMENT SHEET #1

AM Multigraphics® Model 1650



1.	Ink Fountain Roller Crank
2.	Ink Feed Rate Control
3.	Ink Form Roller Knobs
4.	Auto Ink Overide
5.	Ink Ductor Shut-Off
6.	Moisture Feedrate Control
7.	Night Latch Knob (Far Side)
8.	Moisture Ductor Control Lever
9.	Moisture Fountain Roller Knob
10.	Single Lever Control
11.	Moisture Form Roller Knob
12.	Handwheel

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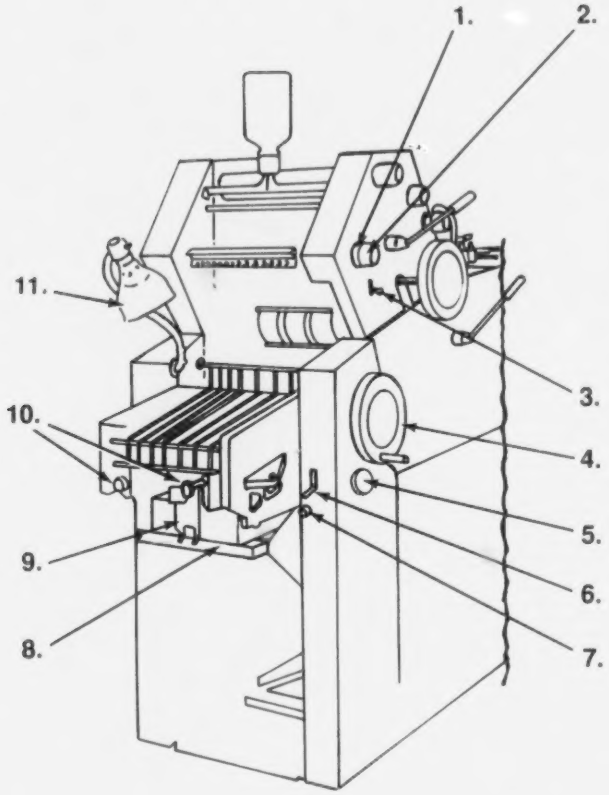
ASSIGNMENT SHEET #1

Chief 15 and Chief 17
(Delivery End)

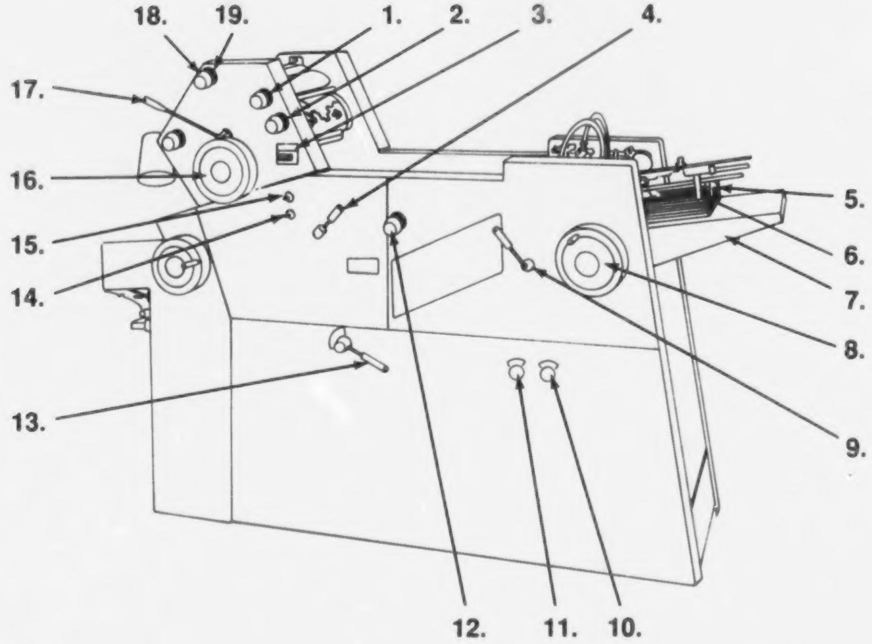


1. Ink Volume Control
2. Ink Fountain Roller Control Knob
3. Ink Fountain Manual Control Lever
4. Delivery Pile Handwheel
5. Delivery Rate Lowering Control
6. Delivery Lock Release
7. Delivery Paper Feed Control
8. Delivery Board
9. Delivery Sheet Stop
10. Delivery Side Guide Control Knobs
11. Delivery Light

(Courtesy American Type Founders Co., Inc.)

ASSIGNMENT SHEET #1

Chief 15 (Left Side)

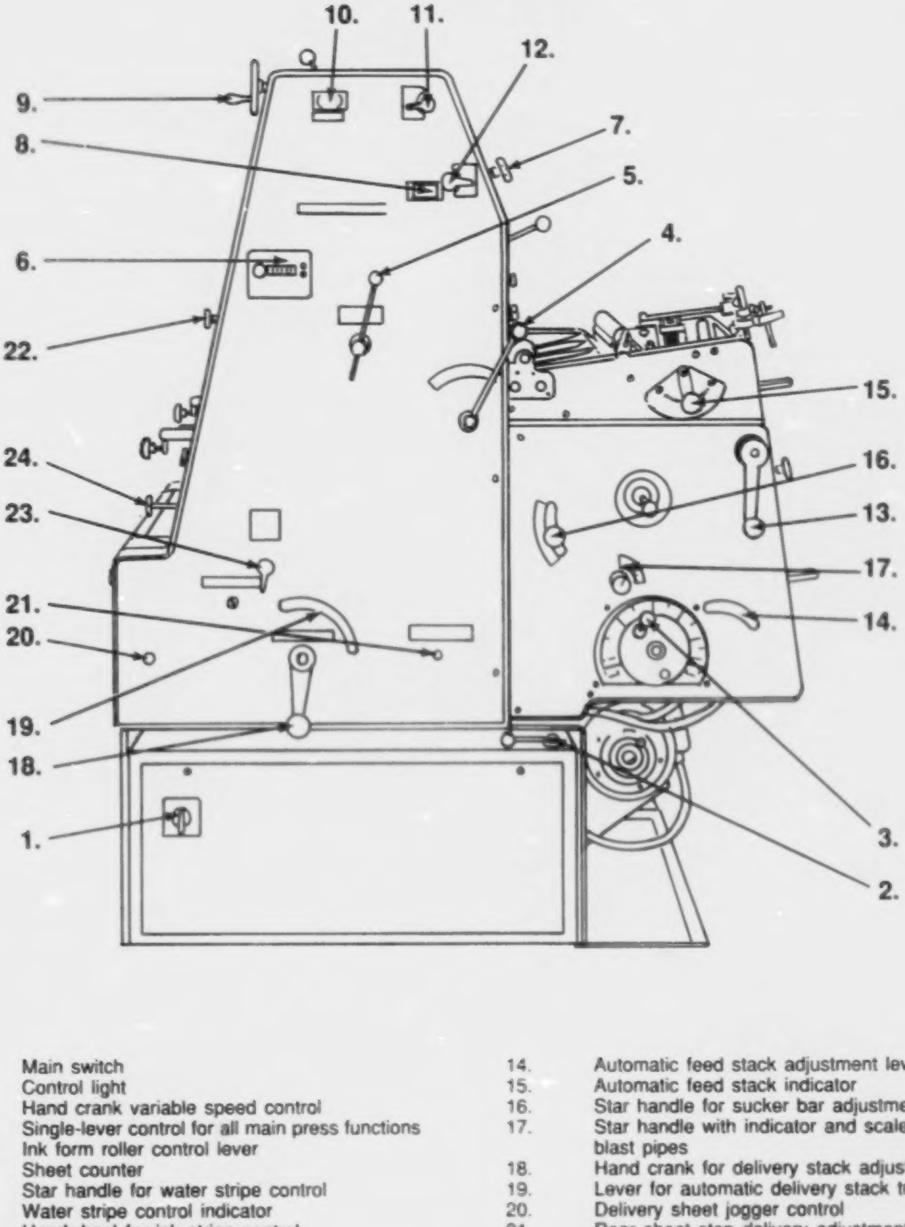


1. Auxiliary Dampener Form Roller Control Knob
2. Vertical Positioning Control Knob
3. Automatic Copy Counter
4. Manual Plate-To-Blanket Impression Control
5. Paper Stack Back Guide
6. Left and Right Paper Stack Side Guides
7. Paper Platform
8. Paper Platform Handwheel
9. Back Paper Feed Control
10. Vacuum Control
11. Air Blow Control
12. Left and Right Jogger Control Knobs
13. Speed Control Lever
14. Air-Vacuum Pump Switch
15. Drive Motor Switch
16. Handwheel
17. Dampener and Ink Form Roller Control Lever
18. Dampener Fountain Roller Control Knob
19. Dampener Volume Control

(Courtesy American Type Founders Co., Inc.)

ASSIGNMENT SHEET #1

Heidelberg GTO

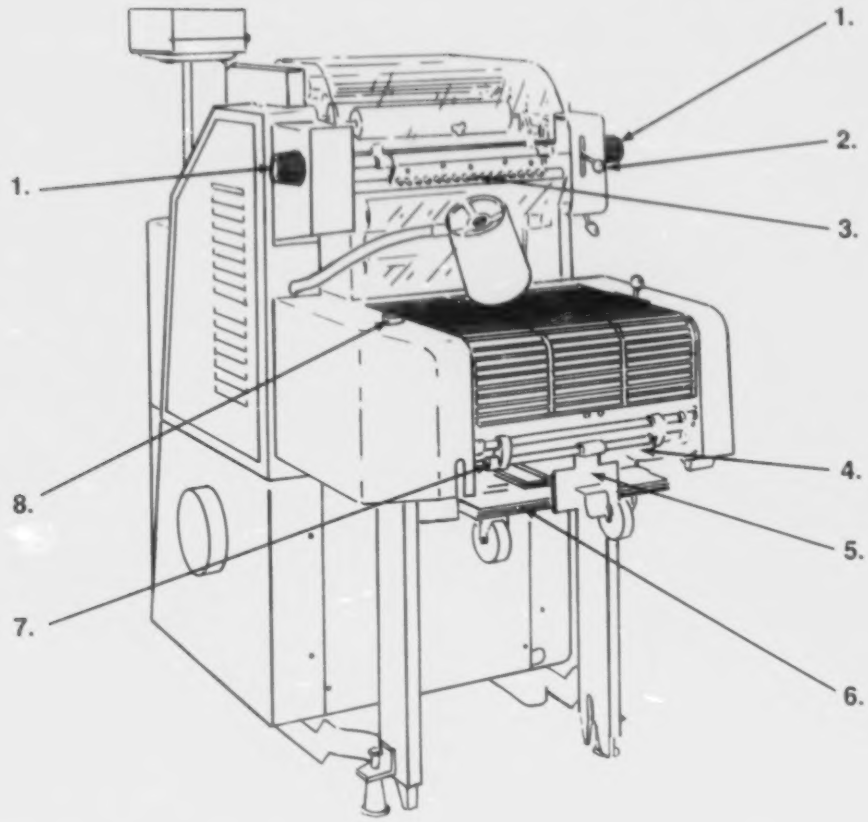


1. Main switch
2. Control light
3. Hand crank variable speed control
4. Single-lever control for all main press functions
5. Ink form roller control lever
6. Sheet counter
7. Star handle for water stripe control
8. Water stripe control indicator
9. Handwheel for ink stripe control
10. Ink stripe control indicator
11. Ink supply control lever
12. Water supply control lever
13. Crank for manual feed stack adjustment
14. Automatic feed stack adjustment lever
15. Automatic feed stack indicator
16. Star handle for sucker bar adjustment
17. Star handle with indicator and scale for air blast pipes
18. Hand crank for delivery stack adjustment
19. Lever for automatic delivery stack transport
20. Delivery sheet jogger control
21. Rear sheet stop delivery adjustment pivot
22. Printing pressure adjusting discs
23. Numbering machine interrupter
24. Numbering machine printing pressure adjustment

(Courtesy Heidelberg Offset)

ASSIGNMENT SHEET #1

Itek 975—Ryobi 3200 (Non Operation Side)

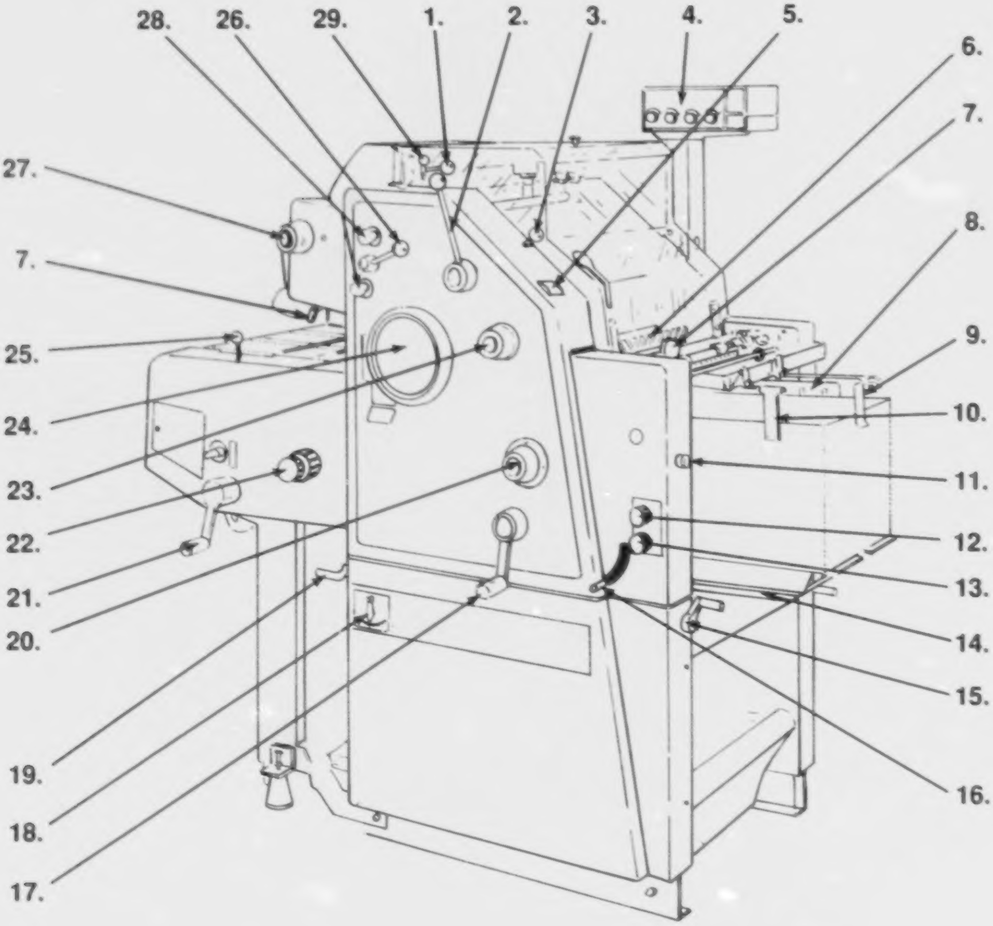


1. Ink fountain roller knob
2. Ink feed volume adjustment lever
3. Ink volume adjustment screws
4. Side jogger for delivery
5. Front guide for delivery
6. Delivery table
7. Side guide for delivery
8. Air blower control knob (Type XLD)

(Courtesy A.B. Dick)

ASSIGNMENT SHEET #1

Itek 975—Ryobi 3200 (Operation Side)



1. Water ductor lever
2. Operating lever
3. Clamp lever
4. Operating panel (Type XLD)
5. Total counter
6. Suction feet
7. Feed lever
8. Micro side guide
9. Back guide
10. Side guide
11. Height control bar adjustment knob
12. Vacuum adjustment knob
13. Blower adjustment knob
14. Paper feed table
15. Vertical guide handle
16. Release lever
17. Crank handle for paper feed table
18. Speed meter
19. Speed change handle
20. Impression pressure dial
21. Crank handle for delivery table
22. Back guide adjustment handle
23. Vertical adjustment knob
24. Handwheel
25. Delivery table automatic lowering lever
26. Ink form roller night latch lever
27. Ink fountain roller knob
28. Form roller shaft knob
29. Water volume adjustment lever

(Courtesy A.B. Dick)

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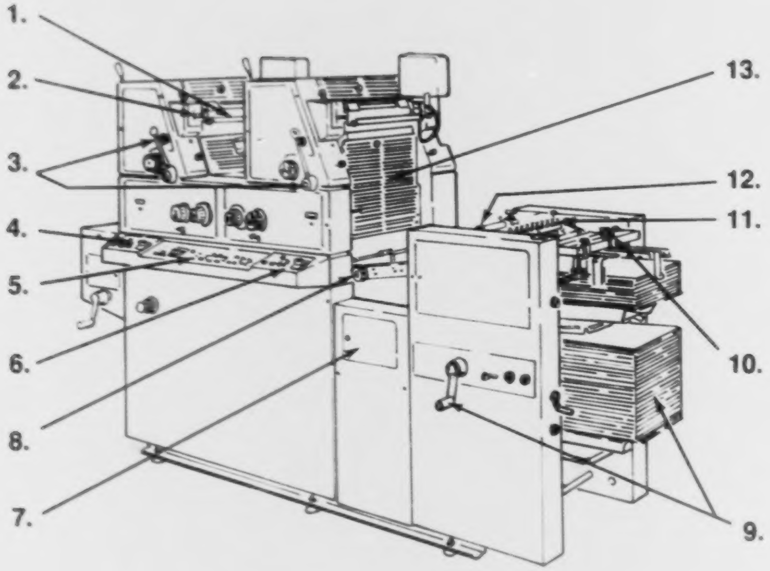
ASSIGNMENT SHEET #1

Itek 3985 (Operation Side)

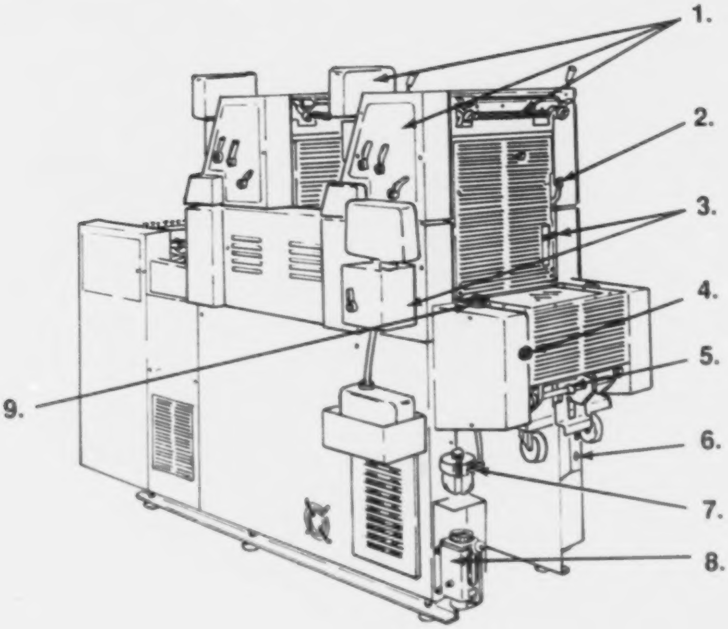


1. Water Section
2. Adjustment Dial
    - Lateral Image Adjustment Dial
    - Vertical Image Adjustment Dial
    - Impression Pressure Adjustment Dial
    - Plate Pressure Adjustment Screw
3. Operating Lever
4. Second Unit Control Sub-Panel
5. Control Panel
    - Drive Switch
    - Speed Control
    - Counter
    - OK Monitor
6. First Unit Control Sub-Panel
7. Sub-Panel
8. Push Side Lay
9. Feeder Pile
10. Feeder
11. Electrostatic Eliminator
12. Feed Board
13. Plate Cylinder, Blanket Cylinder, Upper Feed Roller

(Courtesy A.B. Dick)

ASSIGNMENT SHEET #1

Itek 3985 (Non Operation Side)



1.	Water Section, Ink Section
2.	Ink Roller Cleanup Attachment
3.	Blanket Cleaning Device
4.	Delivery Air Blower
5.	Delivery Guide
6.	Delivery Control Panel • Main Switch
7.	Spray Device
8.	Centralized Oiling Device
9.	Emergency Stop Button

(Courtesy A.B. Dick)

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OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #1—SET UP THE SHEET CONTROL SYSTEMS

Name ______________________________ Attempt Number __________

Evaluation Criteria	**Rating**
• Feeder system set up according to instructions	_____
• Register system set up according to instructions	_____
• Delivery system set up according to instructions	_____

Introduction: Before a successful press run can be accomplished, the press operator must set the press to handle a specific paper size from feed to delivery and maintain register of impression placement. To do that the operator must be skilled in the operation of the feeder, register and delivery systems of the press. This exercise will give the student experience in these adjustments.

A. Tools and materials

1. Standard tools for specific press being set up
2. Paper stock, 8½" x 11"
3. Operator's manual for specific press being used

B. Procedure

(CAUTION: Do not make adjustments on press while it is running.)

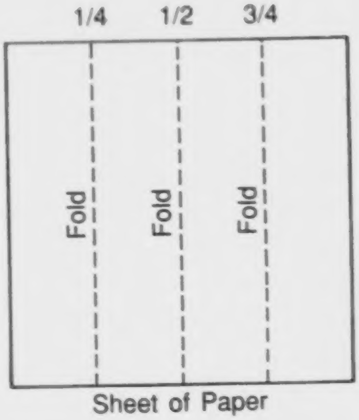
1. Check with instructor before beginning this job sheet.
2. Set up feeder system.
    a. Position front guides for width of paper to be fed so sheet is centered sideways on the feed board.

JOB SHEET #1

b. Set feed table extensions to support paper pile.

(NOTE: Folding the sheet in half twice will divide it into fourths. Place the feed table extensions, the sheet separators, and the sucker tubes approximately at the 1/4 and 3/4 points. See Figure 1.)

FIGURE 1



c. Place the support board for the paper pile on top of the feed table extensions.

(CAUTION: Be sure the support board does not protrude. It should not hit the paper guides as the feed table reaches its top position.)

d. Move the sheet separators to the 1/4 and 3/4 points (as determined by folding the sheet twice) of the gripper edge of the stock being run.

(NOTE: Some small presses have fixed position sheet separators.)

e. Place stock to be run on the feed table support board.

f. Raise feed table so top of pile is near the top feed position.

g. Position the feeder side guides to touch the paper pile.

(NOTE: Make sure the sheets are square against the front guides.)

h. Place back paper guide to hold sheets in position against front guides.

(NOTE: The back guide must not bind the sheets.)

i. Move sucker tube(s) to a position in line with the sheet separators.

(NOTE: Some small presses have fixed position sucker tube sockets so the sucker tubes may be moved to alternate positions.)

j. Slide pullout rollers to position near sucker tubes.

JOB SHEET #1

k. Set stack height for weight of stock being fed.

  1) Turn press on.

  2) Allow stack to feed to pre-set height.

  3) Turn press off.

  4) Turn handwheel until sucker tubes are in the down position.

  5) Observe the distance from the bottom of the sucker tube to the top of the stack.

    1) 1/8" space is recommended for light weight stocks (16 pound or 20 pound bond or lighter).

    2) 1/16" space is recommended for heavier weight paper.

    3) Touch is recommended for heavier card and cover stock.

  6) Adjust stack height regulator to change distance between sucker tube and stack if needed.

  7) Lower paper pile slightly by using hand crank if stack height regulator setting is changed.

  8) Repeat steps **k1** through **k6** until desired setting is obtained.

l. Adjust the air blast to separate the top six or eight sheets when the sucker tubes are in the up and forward position and the stack is at top position.

m. Adjust the vacuum to pick up only one sheet.

  (NOTE: A final setting of vacuum cannot be completed until the press is set up for register and delivery and sheets are fed continuously.)

n. Adjust double sheet detector.

  (NOTE: Small presses which feed directly into the cylinder grippers from the feed table do not normally have a double sheet detector.)

  1) Fold a narrow strip of the stock to be fed so that one end protrudes about an inch.

  2) Slide that folded strip under the detector and adjust for the passing of one sheet and the stopping or deflecting of two or more sheets.

JOB SHEET #1

o. Check pullout roller pressure.

   1) Insert a sheet of stock to be run between the pullout rollers.

   2) Pull the sheet from between the rollers by hand.

      (NOTE: A steady resistance should be noted as the paper slides from between the rollers.)

3. Set up the register system.

   (NOTE: Some small presses do not have a register board; registration is controlled by the sheet position on the feed table and the amount of sheet buckle as the paper is fed directly into the cylinder grippers.)

   a. Turn handwheel until the jogger guide moves to its inward position.

   b. Move jogger guide to the desired final sheet position.

   c. Place a sheet of paper from stock to be run on the register board against the jogger side guide and front paper stops.

   d. Position the movable, fixed position side guide to hold sheet in place.

   e. Move conveyor tapes to carry the sheet flat and for best travel of the paper.

   f. Place paper hold down strips over conveyor tapes close to outer edges of sheets and side guides.

   g. Set paper control wheels or balls to aid in movement, positioning and retaining of the sheet for movement into the cylinder grippers.

      (NOTE: Running one or more wheels just off the trailing edge of the sheet at the paper stop position will prevent any bounce and will help hold each sheet in exact position.)

   h. Adjust feed roller pressure if thickness of stock varies from previously run sheet.

      (NOTE: Check with instructor, then see operator's manual for specific press being set up.)

4. Set up the delivery system.

   a. Tray delivery

      1) Position the receiving tray guides so sheet will be jogged as it is received and held in a straight stack.

      2) Position ejector rollers to run close to the side edges of the sheet if possible.

         (NOTE: If ejector rollers must pass through an image area for proper sheet delivery they must be coated [dampened] continuously to prevent streaking; check with instructor.)

JOB SHEET #1

3) Move ejector rings to control any troublesome curl in the delivered sheets.

(NOTE: To prevent paper jams, sheets must be removed frequently after press run begins; most receiving rays will hold a ream of 500 sheets of light weight paper, i.e., up to 20 pound bond.)

4) Move the paper bail to aid in receiving and stacking the delivered sheets.

b. Chute delivery with receding stacker

1) Position receiving table guides so sheet will be jogged as it is received and held in a straight stack.

2) Set the ejector rollers to run as close to the side edges of the sheet as possible.

(NOTE: If ejector rollers must pass through an image area for proper sheet delivery they must be coated or dampened continuously to prevent streaking; check with instructor.)

3) Move ejector rings to control any troublesome curl in the delivered sheets.

4) Raise delivery table to highest point.

5) Allow 100-150 sheets to be delivered before engaging the stacker lowering mechanism.

(NOTE: Large quantities of stock may be stacked before stock must be removed from the delivery table; to prevent ink from the image on the front of the stacked sheets from setting off onto the backs of the sheets, stock should be removed in whatever quantities are necessary.)

c. Chain delivery

1) Position paper turning guides or wheels for width of stock.

(NOTE: Sometimes the turning guides will streak a heavily inked image area, so they should be positioned accordingly.)

2) Raise the delivery table to the highest point.

3) Move paper guides and joggers to straighten and hold the delivered sheets.

JOB SHEET #1

4) Allow 100-150 sheets to be delivered before engaging the delivery table lowering device.

   (NOTE: Since large quantities of stock may be stacked before stock must be removed from delivery table, notice should be taken to prevent ink from the image on the front of the stacked sheets from setting off onto the backs of the sheets; stock should be removed in whatever quantities are necessary.)

5. Return tools and materials to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #2—SET UP THE IMAGE CONTROL SYSTEMS

Name ______________________________ Attempt Number __________

Evaluation Criteria	**Rating**
• Inking system set up according to instructions	_____
• Dampening system set up according to instructions	_____
• Cylinder system set up according to instructions	_____

Introduction: Before a successful pressrun can be accomplished, the press operator must set the press's inking and dampening system to produce the desired results. This exercise will give the student experience in these adjustments as well as in the adjustments necessary for efficient, in-register impressions by the cylinder system.

A. Tools and materials

   1. Standard tools for specific press being set up
   2. Ink (specified by instructor)
   3. Fountain solution (specified by instructor)
   4. Offset plate
   5. Shop towel (rags)
   6. Operator's manual for specific press being set up

B. Procedure

   1. Check with instructor before beginning this job sheet.
   2. Set up inking system.
      a. Replace rollers which have been removed from press.
      b. Turn off all night latches.
      c. Turn off ink form rollers.
      d. Add limited quantity of ink to ink fountain.

      (NOTE: The type of ink used will be determined by the type of equipment, the type of water system, the type of stock, and other requirements; see job order or talk to the instructor.)

JOB SHEET #2

e. Contact ink ductor roller to ink fountain roller.

f. Rotate ink fountain roller while adjusting the ink fountain screws until an even flow of ink is obtained between the ink fountain and ductor rollers.

g. Place single lever control in appropriate position.

(NOTE: The single lever control is usually in the "off" or "neutral" position during the inking procedure.)

h. Turn on press.

i. Turn on ink feed.

j. Run ink to system until an even velvety appearance shows on all ink rollers.

k. Turn off ink feed.

(NOTE: After initial inking, the quantity of ink fed to the system will depend on that required to cover the image area of the plate.)

l. Turn off press.

3. Set up dampening system.

a. Replace rollers which have been removed from press.

b. Mix fountain solution.

(NOTE: Basic dampening chemistry is covered in Unit II. See instructor for specific usage.)

c. Add fountain solution to water fountain.

(NOTE: On small presses with integrated ink and water systems, only the water feed setting needs to be made after water is put in the fountain.)

d. Contact water ductor roller to water fountain roller.

e. Rotate water fountain roller until ductor roller is soaked with fountain solution.

f. Turn on press.

g. Turn on water feed.

h. Run press until water form roller cover is damp.

(NOTE: Water form roller cover should not be wet enough to squeeze visible moisture from its surface.)

i. Refer to instruction manual or instructor for initial dampening procedure for "bare back" water rollers.

JOB SHEET #2

4. Set up the cylinder system.

    a. Clean plate cylinder surface if needed.

    (NOTE: On presses where the plate does not cover the full cylinder surface, the surface should be kept water-receptive by cleaning and applying plate etch.)

    b. Move plate cylinder head clamp to a square, centered position.

    c. Clean impression cylinder surface if needed.

    (NOTE: The impression cylinder surface should be kept as ink-repellent as possible.)

    d. Clean blanket surface with blanket wash.

    e. Wipe blanket surface dry.

    f. Attach plate to plate cylinder.

    (NOTE: Plate must be clean and coated with preservative.)

        1) Place gripper edge of plate in head clamp or on its pins.

        2) Rotate press by hand as plate is pulled around cylinder to attach tail clamp.

        (NOTE: Plate should fit parallel to edge of plate cylinder and be held taut around cylinder surface.)

    g. Clean impression cylinder surface if needed.

5. Return tools and materials to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #3—OPERATE AN OFFSET PRESS FROM SET UP OF SYSTEM THROUGH PRINTED SHEET DELIVERY

Name ______________________________ Attempt Number __________

Evaluation Criteria	**Rating**
• Control systems accurately set up for job	_____
• Make ready completed satisfactorily	_____
• Press run completed with adequately maintained image position and quality	_____

Introduction: This exercise will give the student experience in press operations from start to finish, producing a satisfactorily printed piece of work.

(NOTE: The application of this job sheet may be made to include the following variations to afford student experience with: 1. different types of plates: paper, electrostatic, photo direct, and metal; 2. varying types of stock: onionskin, bond, coated book, uncoated book, text, index, cover, card, carbonless, gum label, adhesive backed label, envelopes, and others; 3. different sizes of stock from minimum to maximum for a specific press; 4. printing one, two, three, or four colors of ink; 5. variety of ink coverage requirements: uniform, light, heavy, varying, halftones or solids; 6. different image position requirements: loose register, tight register, print front and back, work-and-turn, work-and-tumble; and others the instructor may include.)

A. Tools and materials

1. Standard tools for specific press being set up
2. Paper stock (size specified by instructor)
3. Ink (specified by instructor)
4. Fountain solution (specified by instructor)
5. Offset plate
6. Shop towels (rags)
7. Cotton pads
8. Blanket wash
9. Plate etch

JOB SHEET #3

B. Procedure

1. Check with instructor before beginning this job sheet.

2. Set up sheet control systems (see Job Sheet #1).

3. Set up image control systems (see Job Sheet #2).

4. Load stock to be run on feed table.

5. Position image on sheet being run to job specifications and set cylinder pressures.

   (NOTE: This procedure is called "make ready.")

   a. Premoisten plate.
   b. Turn on press.
   c. Turn on water form roller.
   d. Turn on ink form rollers.
   e. Make image impression from plate to blanket.

      (NOTE: Contact for three or four revolutions is usually enough.)

   f. Turn on air and vacuum.
   g. Turn on feed lever.

      (NOTE: Some small presses start feeding paper when vacuum is turned on.)

   h. Allow two sheets to feed.
   i. Turn off feed lever.

      (NOTE: Some small presses stop feeding only when vacuum is turned off.)

   j. Turn off air and vacuum.
   k. Turn off ink form rollers.
   l. Turn off water form rollers.

      (NOTE: On small presses with integrated ink and water systems there is no separate water form roller.)

   m. Turn off press.

JOB SHEET #3

n. Check position of image.

   1) For squareness

   2) Vertically (relative to gripper edge of sheet)

   3) Horizontally (relative to side guide edge of sheet)

o. Change image position as required.

   1) Squareness

      a) Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.

      b) For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

   2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control knob.

   3) Horizontal—Move paper on feed table and/or register board side to side.

p. Clean and dry blanket.

q. Repeat steps **5n** through **5p** until image is in position as specified by job order.

6. Evaluate image quality for proper impression settings.

   (NOTE: Observe image on blanket first. Image should be sharp with good ink coverage.)

   a. Plate to blanket

   b. Blanket to paper

      (NOTE: If the thickness of the plate being used is different from the previous plate, then plate to blanket pressure setting must be changed. If a lighter or heavier stock is being fed than the previous sheet, then the pressure setting from blanket to impression cylinder will need to be changed.)

7. Change cylinder pressures as required.

   a. Plate to blanket (see operator's manual).

   b. Blanket to impression cylinder (see operator's manual).

JOB SHEET #3

8. Complete press run.
    a. Set sheet counter to 0.
    b. Repeat steps **5a** through **5g** to begin run.
    c. Turn on ink feed.
    d. Reset ink fountain for ink flow to meet image requirements as press run progresses and maintain ink supply in fountain.
    e. Remove paper from receiving tray or stacker as required.

       (NOTE: Because of the condition of set off or delivery difficulties, some stocks must be removed more frequently in smaller quantities.)
    f. Maintain fountain solution level in fountain and monitor distribution to plate.
    g. Remove a printed sheet from the delivery system periodically for inspection.

       (NOTE: **Do not** stop press.)
    h. Make necessary adjustments to maintain image position and quality, and to control paper feed and delivery throughout the press run.
    i. Follow steps **5i** through **5m** at the end of the press run.
    j. Remove last of printed sheets from delivery system.
    k. Remove plate.
    l. Clean plate (front and back).
    m. Prepare plate for storage by applying gum to image side(s).
    n. Clean plate cylinder and coat with plate etch.
    o. Clean and dry blanket.
    p. Clean impression cylinder.
9. Return tools and materials to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #4—PERFORM A COLOR WASH ON AN OFFSET PRESS

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Water and ink systems properly cleaned	_____
• Rollers properly cleaned on an off press	_____
• Light ink run so no traces of dark in remain	_____
• Press cleaned and reassembled properly	_____

Introduction: Quality press work involves a thorough clean-up at the end of each press run. This exercise will give the student experience in cleaning an offset press properly so as to avoid stains and improper colors on the next run.

A. Tools and materials

1. Standard tools for specific press being washed up
2. Blanket wash
3. Cleanup mats or wash up attachment
4. Shop towels (rags)
5. Ink knife
6. Cotton pads
7. Plate cleaner
8. Plate etch

B. Procedure

(NOTE: Ink and water rollers in integrated systems will clean up together with cleanup mat or washup attachment, bare back water rollers must be cleaned separately from ink rollers.)

1. Check with instructor before beginning this job sheet.

   (NOTE: If press has been left in night latch position, night latches must be turned off.)

JOB SHEET #4

2. Clean water system first.

   a. Remove fountain bottle.

   b. Drain water from fountain.

   c. Remove covered water form roller.

3. Remove ink from ink fountain.

   a. Use ink knife, being careful not to scratch ink fountain roller.

   b. Use two 2-inch (approximate) strips the width of the ink fountain blade cut from used cleanup mats or other card stock.

      1) Slide one cardboard strip against the fountain blade under the ink until it touches the fountain roller.

      2) Slide the second cardboard strip against the fountain roller surface through the ink until it touches the first cardboard strip.

      3) Lightly squeeze the two cardboard strips together and lift the ink out of the fountain.

      (NOTE: Lift the ink out slowly while folding the ends of the card strips toward each other to prevent dripping ink on press or floor.)

   c. Discard ink by carefully folding it inside several sheets of old stock.

4. Clean ink fountain unit.

   a. By removing from press

      1) Remove fountain from press.

      2) Clean ink fountain with blanket wash.

      3) Clean ink fountain roller and ink ductor roller.

         a) Rotate the press by turning handwheel to contact ink fountain and ductor rollers.

         b) Turn rollers together and clean with blanket wash.

         c) Remove ductor roller.

         d) Clean ends of both rollers.

   b. By leaving on press

      1) Place cotton pads soaked with blanket wash on fountain blade against fountain roller.

      2) Turn on ink feed to highest setting.

      3) Finish press wash up procedure through step **16**.

JOB SHEET #4

4) Remove ink fountain.

5) Clean ink fountain.

6) Clean ends of ink fountain roller and ductor roller.

7) Proceed with press wash up procedures (steps **17-25**).

5. Attach cleanup mat.

   a. Insert one end of mat in the head clamp like an offset plate.

   b. Attach tail clamp.

   c. Do not tighten tail clamp screws.

   (NOTE: If a wash up attachment is used for cleaning the rollers, the procedure will depend on the type of attachment; check with the operator's manual or the instructor.)

6. Turn on press.

7. Slow the press to slowest speed.

8. Check on/off position of ink form rollers.

   a. With single lever control, form rollers should be in the "on" position and lever in "neutral" or "off" position.

   b. Without single lever control, form rollers should be in the "off" position.

9. Apply small quantity of blanket wash to the top ink rollers.

10. Place ink form rollers against cleanup mat.

    a. With single lever, move lever to ink position.

    b. Without single lever, move form roller knobs to "on" position.

11. Add blanket wash in small quantity as ink and blanket wash are absorbed by cleanup mat.

12. Repeat step **11** until cleanup mat is near saturation.

13. Move ink form rollers from against cleanup mat.

    a. With single lever, move lever to "off" or "neutral" position.

    b. Without single lever, move form roller knobs to "off" position.

    (NOTE: Form rollers should not be turned off until sufficient blanket wash is absorbed from rollers to prevent dripping when press is stopped.)

JOB SHEET #4

14. Turn off press.

15. Remove cleanup mat.

    (NOTE: Cleanup mats may be used once on each side but must be allowed to dry in between.)

16. Repeat steps **5** through **15** until ink rollers appear clean.

    (NOTE: If a dark ink has just been run and the next job calls for a light ink, it may be necessary to charge the ink fountain with a small quantity of the light ink to be run and ink up the press just as if the job were to be printed at this time. This will allow solvents in the light ink to react with any traces of the previous dark ink and bring them to the printing surface to be cleaned as per steps 5 through 15. This seemingly wasteful practice can save a press operator the embarrassment of the light ink "changing colors" during a run as the dark ink comes to the surface during the heat and agitation of printing. Once the light ink has been run, the press can again be cleaned as per steps 5 through 15, and by removing any ink rollers from the press and manually washing them with clean rags and solvent.)

17. Clean ends of all rollers.

18. Wipe all rollers with blanket wash, then dry.

    (NOTE: Sometimes rollers need to be removed from the press for proper wiping.)

19. Clean plate cylinder with water base cleaner, then apply film of plate etch.

20. Clean blanket with blanket wash, then dry.

21. Clean impression cylinder with waterbase cleaner, then apply film of plate etch.

22. Replace all rollers which have been removed from press.

23. Replace ink fountain.

24. Set press in night latch position.

    a. Place all controls in "off" position.

    b. Separate roller surfaces.

25. Clean ink from side frames, side covers, control levers and knobs, and floor around and under press.

26. Return tools and materials to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #5—PRINT ENVELOPES

Name ______________________________ Attempt Number _________

Evaluation Criteria	Rating
• Control systems accurately set up for the job	_____
• Feed table and cylinder pressure adjusted to accommodate envelopes	_____
• Press run completed with adequately maintained image position and quality	_____

Introduction: This exercise gives the student experience in a very common printing project: envelopes.

A. Tools and materials

   1. Standard tools for specific press being set up
   2. Envelope stock (specified by instructor)
   3. Ink (specified by instructor)
   4. Fountain solution (specified by instructor)
   5. Offset plate
   6. Shop towels (rags)
   7. Cotton pads
   8. Blanket wash
   9. Plate etch

B. Procedure

   1. Check with instructor before beginning this job sheet.
   2. Set up sheet control systems (see Job Sheet #1).
   3. Set up image control systems (see Job Sheet #2).
   4. Adjust feed table to envelope stock.
   5. Load stock to be run on feed table.
   6. Position image on sheet being run to job specifications and set cylinder pressure to accommodate extra thickness of envelope stock.

JOB SHEET #5

7. Adjust delivery system for length of stock.

   (NOTE: This procedure is called "make ready.")

8. Begin printing.

   a. Premoisten plate.

   b. Turn on press.

   c. Turn on water form roller.

   d. Turn on ink form roller.

   e. Make image impression from plate to blanket.

      (NOTE: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.)

   f. Turn on air and vacuum.

   g. Turn on feed lever.

      (NOTE: Some small presses begin feeding when vacuum is turned on.)

   h. Allow several sheets to be printed.

   i. Turn off feed lever.

   j. Adjust air and vacuum to accommodate envelope stock.

   k. Adjust double sheet detector to accommodate envelope stock.

      (NOTE: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.)

   l. Turn off air and vacuum.

   m. Turn off ink form rollers.

   n. Turn off water form rollers.

      (NOTE: On small presses with integrated ink and water systems, there is no separate water form roller.)

   o. Turn off press.

   p. Check image.

      1) For squareness

      2) Vertically (relative to gripper edge of stock)

      3) Horizontally (relative to side guide edge of stock)

JOB SHEET #5

4) Proofread image.

(NOTE: The press operator is the final quality control point of the printing process.)

q. Change image position as required.

1) Squareness

a) Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.

b) For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.

3) Horizontal—Move paper on feed table and/or register board side to side.

r. Clean and dry blanket.

s. Repeat steps **8g** through **8q** until image is in position as specified by the job order.

9. Evaluate image quality for proper impression settings.

(NOTE: Observe image on blanket first. Image should be sharp with good ink coverage.)

a. Plate to blanket

b. Blanket to paper

10. Change cylinder pressure as required.

a. Plate to blanket (see operator's manual).

b. Blanket to impression cylinder (see operator's manual).

11. Complete press run.

a. Set sheet counter to 0.

b. Repeat steps **8a** through **8g** to begin run.

c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

d. Remove paper from receiving tray or stacker as required.

JOB SHEET #5

e. Be alert to setoff and adjust spray powders accordingly.

(NOTE: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.)

f. Maintain fountain solution level in fountain and monitor distribution to plate.

g. Remove a printed sheet from the delivery system periodically for inspection.

(NOTE: **Do not** stop press.)

h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

i. Repeat steps **8i** and **8l** through **8o** at the end of the press run.

j. Remove last of printed sheets from the delivery system.

k. Remove plate.

l. Clean plate (front and back).

m. Prepare plate for storage by applying gum to image side(s).

n. Clean plate cylinder and coat plate with etch.

o. Clean and dry blanket.

p. Clean impression cylinder.

12. Return tools and equipment to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #6—CHANGE PRESS FROM ENVELOPES TO LETTERHEAD

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Control systems accurately set up for the job	_____
• Feed table and cylinder pressure adjusted to accommodate paper stock	_____
• Press run completed with adequately maintained image position and quality	_____

Introduction: This exercise gives the student experience in a very common printing project: shifting the press from printing envelopes to a run involving letterhead.

(NOTE: This job sheet was developed to be accomplished immediately after Job Sheet #5 with the press set up for the previous envelope job.)

A. Tools and materials

1. Standard tools for specific press being set up
2. Paper stock (specified by instructor)
3. Ink (specified by instructor)
4. Fountain solution (specified by instructor)
5. Offset plate
6. Shop towels (rags)
7. Cotton pads
8. Blanket wash
9. Plate etch

B. Procedure

1. Check with instructor before beginning this job sheet.
2. Adjust feed table to accommodate stock.
3. Load stock to be run on feed table.
4. Mount plate.
5. Mount blanket.

JOB SHEET #6

6. Position image on sheet being run to job specifications and set cylinder pressure to accommodate different blanket from envelope job.

7. Adjust delivery system for length of stock.

8. Begin printing.

   a. Premoisten plate.

   b. Turn on press.

   c. Turn on water form roller.

   d. Turn on ink form roller.

   e. Make image impression from plate to blanket.

      (NOTE: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.)

   f. Turn on air and vacuum.

   g. Turn on feed lever.

      (NOTE: Some small presses begin feeding when vacuum is turned on.)

   h. Allow several sheets to be printed.

   i. Turn off feed lever.

   j. Adjust air and vacuum to accommodate paper stock.

   k. Adjust double sheet detector to accommodate single sheet letterhead stock.

      (NOTE: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.)

   l. Turn off air and vacuum.

   m. Turn off ink form rollers.

   n. Turn off water form rollers.

      (NOTE: On small presses with integrated ink and water systems, there is no separate water form roller.)

   o. Turn off press.

JOB SHEET #6

p. Check image.

  1) For squareness

  2) Vertically (relative to gripper edge of stock)

  3) Horizontally (relative to side guide edge of stock)

  4) Proofread image.

  (NOTE: The press operator is the final quality control point of the printing process.)

q. Change image position as required.

  1) Squareness

    a) Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.

    b) For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

  2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.

  3) Horizontal—Move paper on feed table and/or register board side to side.

r. Clean and dry blanket.

s. Repeat steps **8g** through **8r** until image is in position as specified by the job order.

9. Evaluate image quality for proper impression settings.

(NOTE: Observe image on blanket first. Image should be sharp with good ink coverage.)

  a. Plate to blanket

  b. Blanket to paper

10. Change cylinder pressure as required.

  a. Plate to blanket (see operator's manual).

  b. Blanket to impression cylinder (see operator's manual).

JOB SHEET #6

11. Complete press run.

    a. Set sheet counter to 0.

    b. Repeat steps **8a** through **8g** to begin run.

    c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

    d. Remove paper from receiving tray or stacker as required.

    e. Be alert to setoff and adjust spray powders accordingly.

       (NOTE: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.)

    f. Maintain fountain solution level in fountain and monitor distribution to plate.

    g. Remove a printed sheet from the delivery system periodically for inspection.

       (NOTE: **Do not** stop press.)

    h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

    i. Repeat steps **8i** and **8l** through **8o** at the end of the press run.

    j. Remove last of printed sheets from the delivery system.

    k. Remove plate.

    l. Clean plate (front and back).

    m. Prepare plate for storage by applying gum to image side(s).

    n. Clean plate cylinder and coat plate with etch.

    o. Clean and dry blanket.

    p. Clean impression cylinder.

12. Return tools and equipment to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #7—PRINT A TWO-COLOR JOB

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Control systems accurately set up for the job	_____
• First color press run completed with adequately maintained image position and quality	_____
• Press properly cleaned and set up for second color	_____
• Second color press run completed with exact register maintained	_____

Introduction: This exercise gives the student practical experience in maintaining press cleanliness and register with two color runs which must be held in register.

(NOTE: This unit assumes student has accomplished Job Sheet #4—Perform a Color Wash on an Offset Press.)

A. Tools and materials

1. Standard tools for specific press being set up
2. Paper stock (specified by instructor)
3. Inks (specified by instructor)
4. Fountain solution (specified by instructor)
5. Offset plates (provided by instructor)
6. Offset blankets (provided by instructor)
7. Shop towels (rags)
8. Cotton pads
9. Blanket wash
10. Plate etch

JOB SHEET #7

B. Procedure

1. Check with instructor before beginning this job sheet.
2. Set up sheet control systems (see Job Sheet #1).
3. Set up image control systems (see Job Sheet #2).
4. Adjust feed table to accommodate stock.
5. Load stock to be run on feed table.
6. Position image on sheet being run to job specifications.
7. Adjust delivery system for length of stock.
8. Begin printing.
    a. Premoisten plate.
    b. Turn on press.
    c. Turn on water form roller.
    d. Turn on ink form roller.
    e. Make image impression from plate to blanket.

       (NOTE: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.)

    f. Turn on air and vacuum.
    g. Turn on feed lever.

       (NOTE: Some small presses begin feeding when vacuum is turned on.)

    h. Allow several sheets to be printed.
    i. Turn off feed lever.
    j. Adjust air and vacuum to accommodate paper stock.
    k. Adjust double sheet detector to accommodate envelope stock.

       (NOTE: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.)

    l. Turn off air and vacuum.
    m. Turn off ink form rollers.

JOB SHEET #7

- n. Turn off water form rollers.

  (NOTE: On small presses with integrated ink and water systems, there is no separate water form roller.)

- o. Turn off press.
- p. Check image.
  - 1) For squareness
  - 2) Vertically (relative to gripper edge of stock)
  - 3) Horizontally (relative to side guide edge of stock)
  - 4) Proofread image.

    (NOTE: The press operator is the final quality control point of the printing process.)

- q. Change image position as required.
  - 1) Squareness
    - a) Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
    - b) For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.
  - 2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.
  - 3) Horizontal—Move paper on feed table and/or register board side to side.
- r. Clean and dry blanket.
- s. Repeat steps **8g** through **8r** until image is in position as specified by the job order.

9. Evaluate image quality for proper impression settings.

   (NOTE: Observe image on blanket first. Image should be sharp with good ink coverage. Also, use a magnifying glass to check dot structure of halftones and screen tints on printed sheet. Dots should be round. If they are oval or skewed, excessive cylinder pressure is indicated.)

   - a. Plate to blanket
   - b. Blanket to paper

JOB SHEET #7

10. Change cylinder pressure as required.

    a. Plate to blanket (see operator's manual)

    b. Blanket to impression cylinder (see operator's manual)

11. Complete press run.

    a. Set sheet counter to 0.

    b. Repeat steps **8a** through **8g** to begin run.

    c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

    d. Run a number of extra sheets to compensate for wastage possible in handling and second color run.

    (NOTE: Ask your instructor what formula to use in determining overrun for this purpose.)

    e. Remove paper from receiving tray or stacker as required and place on a drying rack for later use.

    f. Be alert to setoff and adjust spray powders accordingly.

    (NOTE: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.)

    g. Maintain fountain solution level in fountain and monitor distribution to plate.

    h. Remove a printed sheet from the delivery system periodically for inspection.

    (NOTE: **Do not** stop press.)

    i. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

    j. Repeat steps **8i** and **8l** through **8o** at the end of the press run.

    k. Remove last of printed sheets from the delivery system.

    l. Remove plate.

    m. Clean plate (front and back).

    n. Prepare plate for storage by applying gum to image side(s).

JOB SHEET #7

   o. Clean plate cylinder and coat plate with etch.

   p. Clean and dry blanket.

   q. Clean impression cylinder.

12. Perform color wash (see Job Sheet #4).

13. Load ink fountain with specified second color ink.

14. Mount plate with second color image.

15. Follow steps **2** through **11** for second run.

    (NOTE: Printing a two-color job requires the utmost skill in maintaining exact register of both printing impressions. Care must be taken in all steps to ensure images are printed in exactly the position they are intended. This requires care in make ready, care in printing, and monitoring the job throughout the press run.)

16. Return tools and equipment to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #8—PRINT A WORK-AND-TURN

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Control systems accurately set up for the job	_____
• First press run completed with adequately maintained image position and quality	_____
• Work turned from side to side and second press run completed with proper attention to quality control	_____

Introduction: This exercise gives the student practical experience in manipulating the press and printing stock during the very common practice of work-and-turn.

A. Tools and materials

1. Standard tools for specific press being set up
2. Paper stock (specified by instructor)
3. Inks (specified by instructor)
4. Fountain solution (specified by instructor)
5. Offset plate (provided by instructor)
6. Shop towels (rags)
7. Cotton pads
8. Blanket wash
9. Plate etch

B. Procedure

1. Check with instructor before beginning this job sheet.
2. Set up sheet control systems (see Job Sheet #1).
3. Set up image control systems (see Job Sheet #2).
4. Adjust feed table to accommodate stock.
5. Load stock to be run on feed table.

JOB SHEET #8

6. Position image on sheet being run to job specification and set cylinder pressure to accommodate stock.

7. Adjust delivery system for length of stock.

8. Begin printing job.

    a. Premoisten plate.

    b. Turn on press.

    c. Turn on water form roller.

    d. Turn on ink form roller.

    e. Make image impression from plate to blanket.

    (NOTE: Contact for three of four revolutions is usually enough. Check for brightness of image and complete transfer from plate.)

    f. Turn on air and vacuum.

    g. Turn on feed lever.

    (NOTE: Some small presses begin feeding when vacuum is turned on.)

    h. Allow several sheets to be printed.

    i. Turn off feed lever.

    j. Adjust air and vacuum to accommodate paper stock.

    k. Adjust double sheet detector to accommodate envelope stock.

    (NOTE: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.)

    l. Turn off air and vacuum.

    m. Turn off ink form rollers.

    n. Turn off water form rollers.

    (NOTE: On small presses with integrated ink and water systems, there is no separate water form roller.)

JOB SHEET #8

- o. Turn off press.
- p. Check image.
  - 1) For squareness
  - 2) Vertically (relative to gripper edge of stock)
- q. Change image position as required.
  - 1) Squareness
    - a) Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.
    - b) For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.
  - 2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.
  - 3) Horizontal—Move paper on feed table and/or register board side to side.
- r. Clean and dry blanket.
- s. Repeat steps **8g** through **8r** until image is in position as specified by the job order.

9. Evaluate image quality for proper impression settings.

   (NOTE: Observe image on blanket first. Image should be sharp with good ink coverage.)

   - a. Plate to blanket
   - b. Blanket to paper

10. Change cylinder pressure as required.
    - a. Plate to blanket (see operator's manual).
    - b. Blanket to impression cylinder (see operator's manual).

11. Complete press run allowing for extra impressions in case of spoilage in second run.
    - a. Set sheet counter to 0.
    - b. Repeat steps **8a** through **8g** to begin run.
    - c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.
    - d. Remove paper from receiving tray or stacker as required.

JOB SHEET #8

e. Be alert to setoff and adjust spray powders accordingly.

(NOTE: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.)

f. Maintain fountain solution level in fountain and monitor distribution to plate.

g. Remove a printed sheet from the delivery system periodically for inspection.

(NOTE: **Do not** stop press.)

h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

i. Repeat steps **8i** and **8l** through **8o** at the end of the press run.

j. Remove last of printed sheets from the delivery system.

k. Turn printed sheets over (side to side) and place them on the feed table for second run on press.

l. Adjust side guide on feeder table and press to accommodate second run on the back of previously printed sheets.

m. Repeat steps **8a** through **8g** to make second run.

(NOTE: Be certain to check image placement and register throughout second run.)

n. Repeat steps **8i** and **8l** through **8o** to end of run.

o. Remove plate.

p. Clean plate (front and back).

q. Prepare plate for storage by applying gum to image side(s).

r. Clean plate cylinder and coat plate with etch.

s. Clean and dry blanket.

t. Clean impression cylinder.

12. Return tools and equipment to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #9—PRINT HALFTONES & SCREEN TINTS

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Make ready properly performed for the job	_____
• Cylinder pressure accurately set for quality results	_____
• Press run completed so that dots of screen tints and halftones are round and displayed well-inked bright image	_____

Introduction: This exercise will give the student experience in printing commonly encountered halftones and screen tints, a technique that requires proper cylinder adjustment.

A. Tools and materials

1. Standard tools for specific press being set up
2. Paper stock (specified by instructor)
3. Ink (specified by instructor)
4. Fountain solution (specified by instructor)
5. Offset plate (provided by instructor)
6. Shop towels (rags)
7. Cotton pads
8. Blanket wash
9. Plate etch

B. Procedure

1. Check with instructor before beginning this job sheet.
2. Set up sheet control systems (see Job Sheet #1).
3. Set up image control systems (see Job Sheet #2).
4. Adjust feed table to accommodate stock.
5. Load stock to be run on feed table.

JOB SHEET #9

6. Position image on sheet being run to job specifications and set cylinder pressure to accommodate stock.
7. Adjust delivery system for length of stock.
8. Begin printing.
    a. Premoisten plate.
    b. Turn on press.
    c. Turn on water form roller.
    d. Turn on ink form roller.
    e. Make image impression from plate to blanket.

       (NOTE: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.)
    f. Turn on air and vacuum.
    g. Turn on feed lever.

       (NOTE: Some small presses begin feeding when vacuum is turned on.)
    h. Allow several sheets to be printed.
    i. Turn off feed lever.
    j. Adjust air and vacuum to accommodate stock.
    k. Adjust double sheet detector to accommodate stock.

       (NOTE: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.)
    l. Turn off air and vacuum.
    m. Turn off ink form rollers.
    n. Turn off water form rollers.

       (NOTE: On small presses with integrated ink and water systems, there is no separate water form roller.)
    o. Turn off press.
    p. Check image.
        1) For squareness
        2) Vertically (relative to gripper edge of stock)

JOB SHEET #9

3) Horizontally (relative to side guide edge of stock)

4) Proofread image.

(NOTE: The press operator is the final quality control point of the printing process.)

q. Change image position as required.

1) Squareness

a) Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.

b) For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.

3) Horizontal—Move paper on feed table and/or register board side to side.

r. Clean and dry blanket.

s. Repeat steps **8g** through **8r** until image is in position as specified by the job order.

9. Evaluate image quality for proper impression settings.

(NOTE: Use a magnifying glass to check dot structure of halftones and screen tints on printed sheet. Dots should be round. If they are oval or otherwise skewed, cylinder pressure is too great. Also, be certain enough ink is being transferred for a bright image and full coverage in the dot pattern. At this point, some printers compare a printed sheet with the original negative on a light table to evaluate their printing quality.)

a. Plate to blanket

b. Blanket to paper

10. Change cylinder pressure as required.

(NOTE: This step is critical to halftone and screen tint printing.)

a. Plate to blanket (see operator's manual).

b. Blanket to impression cylinder (see operator's manual).

11. Complete press run.

a. Set sheet counter to 0.

b. Repeat steps **8a** through **8g** to begin run.

JOB SHEET #9

c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

d. Remove paper from receiving tray or stacker as required.

(NOTE: Watch delivery stack and monitor printed sheets to be certain just-printed sheets are not smearing the dot structure of sheets already in the delivery pile.)

e. Be alert to setoff and adjust spray powders accordingly.

(NOTE: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Some stocks must be removed more frequently from the delivery pile or in smaller lifts than others.)

f. Maintain fountain solution level in fountain and monitor distribution to plate.

g. Remove a printed sheet from the delivery system periodically for inspection.

(NOTE: **Do not** stop press.)

h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

i. Repeat steps **8l** and **8l** through **8o** at the end of the press run.

j. Remove last of printed sheets from the delivery system.

k. Remove plate.

l. Clean plate (front and back).

m. Prepare plate for storage by applying gum to image side(s).

n. Clean plate cylinder and coat plate with etch.

o. Clean and dry blanket.

p. Clean impression cylinder.

12. Return tools and equipment to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #10—PRINT SOLIDS

Name ______________________ Attempt Number ________

Evaluation Criteria	**Rating**
• Make ready properly performed with delivery system adjusted for heavy inking	_____
• Press run completed with care so inking and delivery problems were avoided or corrected	_____

Introduction: This exercise will give the student experience in printing solids which require care in adjustment because of heavy inking required to produce satisfactory results.

A. Tools and materials

1. Standard tools for specific press being set up
2. Paper stock (specified by instructor)
3. Ink (specified by instructor)
4. Fountain solution (specified by instructor)
5. Offset plate (provided by instructor)
6. Shop towels (rags)
7. Cotton pads
8. Blanket wash
9. Plate etch

B. Procedure

1. Check with instructor before beginning this job sheet.
2. Set up sheet control systems (see Job Sheet #1).
3. Set up image control systems (see Job Sheet #2).
4. Adjust feed table to accommodate stock.
5. Load stock to be run on feed table.

JOB SHEET #10

6. Position image on sheet being run to job specifications and set cylinder pressure to accommodate stock.

7. Adjust delivery system for length of stock and potential curling of heavily-inked stock.

   (NOTE: Chain delivery is almost essential for printing solids on duplicator type presses. Without chain delivery to pull stock and tacky coating of ink away from the cylinder, ring or wheel extractors are hard pressed to perform the job.)

8. Begin printing.

   a. Premoisten plate.

   b. Turn on press.

   c. Turn on water form roller.

   d. Turn on ink form roller.

   e. Make image impression from plate to blanket.

      (NOTE: Contact for three or four revolutions is usually enough. Check for brightness of image and complete transfer from plate.)

   f. Turn on air and vacuum.

   g. Turn on feed lever.

      (NOTE: Some small presses begin feeding when vacuum is turned on.)

   h. Allow several sheets to be printed.

   i. Turn off feed lever.

   j. Adjust air and vacuum to accommodate paper stock.

   k. Adjust double sheet detector to accommodate envelope stock.

      (NOTE: One quick way to check double sheet detector is to fold stock nearly in half, manually feed single thickness into double sheet detector, then finally the folded "extra" portion. When the double thickness reaches the detector, it should trip.)

   l. Turn off air and vacuum.

   m. Turn off ink form rollers.

   n. Turn off water form rollers.

      (NOTE: On small presses with integrated ink and water systems, there is no separate water form roller.)

   o. Turn off press.

JOB SHEET #10

p. Check image.

  1) For squareness

  2) Vertically (relative to gripper edge of stock)

  3) Horizontally (relative to side guide edge of stock)

  4) Proofread image.

  (NOTE: The press operator is the final quality control point of the printing process.)

q. Change image position as required.

  1) Squareness

    a) Release plate tail clamp, then angle plate around cylinder by adjusting angle of head clamp, then reinsert tail clamp.

    b) For presses with adjustable drop guides, the sheet angle position may be changed by moving these guides.

  2) Vertical—Adjust plate or blanket cylinder setting using vertical image position control.

  3) Horizontal—Move paper on feed table and/or register board side to side.

r. Clean and dry blanket.

s. Repeat steps **8g** through **8r** until image is in position as specified by the job order.

9. Evaluate image quality for proper impression settings.

(NOTE: Check for full, even coverage in the solids, watching for any signs of streaking or problems in the delivery system.)

  a. Plate to blanket

  b. Blanket to paper

10. Change cylinder pressure as required.

  a. Plate to blanket (see operator's manual).

  b. Blanket to impression cylinder (see operator's manual).

11. Adjust ink feed as necessary to produce specified results in solids.

(NOTE: Many times a printing job requiring solids also will require the addition of reducers, anti-piling agents, anti-static agents and driers to the ink fountain. Check with your instructor concerning the need for these preparations.)

JOB SHEET #10

12. Complete press run.

    a. Set sheet counter to 0.

    b. Repeat steps **8a** through **8g** to begin run.

    c. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

    d. Remove paper from receiving tray or stacker as required.

    (NOTE: With heavy coat of tacky ink necessary in printing solids, the operator must keep close watch on delivered sheets to correct problems as they develop.)

    e. Be alert to setoff and adjust spray powders accordingly.

    (NOTE: Spray powders are not meant to absorb or blot ink. They are intended only to be used as a bearing surface between sheets to maintain an ever-so-small clearance between just-printed surfaces of stock in the delivery tray and stock arriving from the press. Spray powder should not be apparent from the nozzles of the applicator. If it is, there is too much powder being run. Excessive spray powders used in a job with solid ink coverage can show up as white spots and piling on the finished sheet. Because of the amount of ink used in solids and delivery difficulties, stock should be removed frequently in small lifts and spread out in a well-ventilated drying area.)

    f. Maintain fountain solution level in fountain and monitor distribution to plate.

    g. Remove a printed sheet from the delivery system periodically for inspection.

    (NOTE: **Do not** stop press.)

    h. Make necessary adjustments to maintain image position and quality and to control paper feed and delivery throughout the press run.

    i. Repeat steps **8i** and **8l** through **8o** at the end of the press run.

    j. Remove last of printed sheets from the delivery system.

    k. Remove plate.

    l. Clean plate (front and back).

    m. Prepare plate for storage by applying gum to image side(s).

    n. Clean plate cylinder and coat plate with etch.

    o. Clean and dry blanket.

    p. Clean impression cylinder.

13. Return tools and equipment to proper storage.

OFFSET PRESS OPERATING PROCEDURES
UNIT III

JOB SHEET #11—PERFORM PERFORATION AND SCORING

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Perforation and scoring material installed according to instructions	_____
• Impression cylinder pressure adjusted to accommodate perforation and scoring material	_____
• Even perforation and/or scoring maintained throughout press run	_____

Introduction: This exercise will give the student experience in adjusting the press to perforate and score stock, a demand of many printing jobs in the commercial world.

A. Tools and materials

1. Standard tools for specific press being set up
2. Paper stock (specified by instructor)
3. Ink (specified by instructor)
4. Fountain solution (specified by instructor)
5. Offset plate exposed for job to be scored or perforated
6. Blanket (provided by instructor)

   (NOTE: This operation will ruin the blanket for further use.)
7. Adhesive perforation and scoring material such as Lith-O-Perf
8. Shop towels (rags)
9. Cotton pads
10. Blanket wash
11. Plate etch

B. Procedure

1. Check with instructor before beginning this job sheet.
2. Set up sheet control systems (see Job Sheet #1).
3. Set up image control systems (see Job Sheet #2).

4. Make ready press and job stock.

5. Make coarse adjustment of cylinder pressure to accommodate addition of adhesive perforation and scoring material.

6. Premoisten plate.

7. Turn on press.

8. Turn on water form roller.

9. Turn on ink form roller.

10. Make image impression from plate to blanket to evaluate inking and plate position.

    (NOTE: Contact for three or four revolutions is usually enough.)

11. Turn off ink form roller.

12. Turn off water form roller.

13. Turn off press.

14. Attach commercial adhesive scoring and perforation material to impression cylinder.

    a. Remove paper backing.

    b. Carefully attach perforation or scoring material (whichever is specified in job ticket) to impression cylinder by pressing into position by hand and running fingers along length of material to seat it to the cylinder.

       (NOTE: In some cases, adhesive perforation and scoring material will have to be seated firmly with a small hammer. In all cases, however, follow the manufacturer's directions for installation.)

15. Turn on ink form roller.

16. Turn on water form roller.

17. Turn on press.

18. Turn on air and vacuum.

19. Turn on feed lever; allow several sheets to be fed.

20. Turn off feed lever.

21. Turn off ink form roller.

22. Turn off water form roller.

23. Turn off air and vacuum.

24. Turn off press.

JOB SHEET #11

25. Examine printed sheets to determine if image and perforation and scoring material are properly positioned; adjust as necessary.

26. Adjust blanket to impression cylinder pressure as necessary to assure even perforation or scoring.

27. Turn on ink form rollers.

28. Turn on water form rollers.

29. Turn on press.

30. Turn on air and vacuum.

31. Adjust air and vacuum to accommodate paper stock.

32. Adjust double sheet detector to accommodate stock.

33. Complete press run.

    a. Reset ink fountain flow to meet image requirements as press run progresses, and maintain ink supply in fountain.

    b. Remove paper from receiving tray or stacker as required.

    c. Maintain fountain solution level in fountain and monitor distribution to plate.

    d. Remove a printed sheet form the delivery system periodically for inspection of image and perforation and/or scoring.

    e. Make necessary adjustments to maintain image position and quality, and to control paper feed and delivery throughout the press run.

34. Follow steps **20** through **24** to end the press run.

35. Remove last of printed sheets from the delivery system.

36. Remove perforation and scoring material from impression cylinder.

37. Remove blanket and discard.

    (NOTE: During the perforation and/or scoring, the blanket has been providing a resilient back pressure for the cutting operation. This wear ruins the blanket for future use unless it will be run again with this same plate and job specification. Because of this expense, many shops maintain a perforating and scoring machine, or are equipped with a letter press which can run a perf and score head.)

38. Remove plate.

39. Clean plate (front and back).

40. Prepare plate for storage by applying gum to image side(s).

JOB SHEET #11

41. Clean plate cylinder and coat plate with etch.
42. Clean impression cylinder.
43. Return tools and equipment to proper storage.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

UNIT OBJECTIVE

After completion of this unit, the student should be able to troubleshoot basic press problems and to conduct required daily, weekly and monthly preventive maintenance on a sheet-fed offset press. Competencies will be demonstrated by completing the assignment sheets, job sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to preventive maintenance and troubleshooting with the correct definitions.
2. List advantages of a routine, thorough preventive maintenance program.
3. Name the areas of work in a preventive maintenance program.
4. Match preventive maintenance schedules with their descriptions.
5. Select true statements concerning requirements for a preventive maintenance schedule in chart form.
6. Select true statements concerning preventive maintenance procedures for daily cleanup.
7. List preventive maintenance procedures for weekly cleanup.
8. List preventive maintenance procedures for monthly cleanup.
9. Select correct procedures for daily, weekly, and monthly lubrication.
10. Complete a list of daily and weekly adjustment procedures.
11. List monthly adjustment requirements.
12. Arrange in order the steps in making an ink form roller check.
13. Identify ink stripe configurations.
14. Arrange in order the sequence of troubleshooting techniques.
15. List categories of press troubles.
16. Distinguish between types of emulsification.
17. Describe the technique for avoiding emulsification.

OBJECTIVE SHEET

18. Select from a list conditions that create ink drying problems.

19. Match common ink troubles on the press with their descriptions.

20. List guidelines for evaluating good print quality.

21. Match print quality problems with their causes.

22. Use a troubleshooting guide to find the best solution to an ink and dampening problem. (Assignment Sheet #1)

23. Use a troubleshooting guide to find the best solution to a paper stock problem. (Assignment Sheet #2)

24. Use a troubleshooting guide to find the best solution to a process problem. (Assignment Sheet #3)

25. Use a troubleshooting guide to find the best solution to a mechanical problem. (Assignment Sheet #4)

26. Determine lubrication requirements for a specific press. (Assignment Sheet #5)

27. Set up a preventive maintenance schedule in chart form. (Assignment Sheet #6)

28. Take an inventory of spare parts. (Assignment Sheet #7)

29. Adjust dampener rollers to plate cylinder. (Job Sheet #1)

30. Adjust ink form rollers to plate cylinder. (Job Sheet #2)

31. Adjust plate cylinder to blanket cylinder. (Job Sheet #3)

32. Adjust blanket cylinder to impression cylinder. (Job Sheet #4)

33. Change a molleton cover. (Job sheet #5)

34. Degrease plate and impression cylinders. (Job Sheet #6)

35. Deglaze ink rollers and blanket. (Job Sheet #7)

36. Change blanket. (Job Sheet #8)

37. Backflush vacuum pump. (Job Sheet #9)

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

INFORMATION SHEET

I. **Terms and definitions**

A. Blanket powder—A powder used to protect the surface of a rubber offset blanket during storage and to aid in maintaining the blanket's resilience

B. Chalking—Ink on the paper turning dry and powdery

C. Deglazer—A cleaner used to dissolve dried ink, solvent and gum deposits from the surfaces of press rollers and blanket

D. Degreaser—A cleaner used to remove oil and grease residue from the plate and impression cylinder surfaces

E. Emulsification—A mixing of ink and fountain solution affecting the separation of image and nonimage areas of the offset plate

F. Ink glaze—A thin layer of hardened ink, fountain solution, and blanket wash which forms on press rollers and blankets

G. Misting—Ink flying into atmosphere as fine mist, especially at high temperature and speed

H. Paper glaze—A thin layer of tiny particles of clay, sizing, lint, and other paper components that forms on the press rollers and blanket

I. Picking—Ink tearing away part of the paper coating as the sheet is printed; this appears as black spots in the blank areas of the printed sheet and white spots in the solid areas

J. Piling—Ink building up on rollers, plate, and/or blanket

K. Preventive maintenance—The performance of routine inspection, cleaning, adjusting, lubrication, and minor repairs which aid in preventing major equipment failure and process troubles

L. Pumice powder—Powdered volcanic rock used for cleaning and scouring surfaces which must be free of oil residue

M. Scumming—Plate picking up ink in the clear areas and transferring it to the clear area of the sheet

N. Sensitized roller—A rubber ink roller that will not hold ink on its surface because of fountain solution, etch, and other chemicals dried in the pores

O. Set-off—Ink transferred from the front surface of one sheet to the back surface of the sheet above in the delivery pile

INFORMATION SHEET

P. Tinting—Emulsified ink suspended in the fountain solution on the plate surface appearing as a uniform tint on printed sheet

Q. Toning—Ink adhering to nonimage area of plate and transferring to printed sheet because of lack of dampening

R. Trapping—Ability of an ink to print over a previously applied ink

S. Troubleshooting—The process of analyzing problems to determine probable causes and applying possible solutions until a problem is solved

T. Water miscible cleaner—A cleaner that mixes with water to remove water soluble particles from press rollers, blanket, and cylinders

II. Advantages of a routine, thorough preventive maintenance program

A. Prevents time loss due to press breakdown

B. Lengthens life of rollers and blanket

C. Aids in delivering a clean product

D. Prevents excessive wear on moving parts

E. Insures longer periods of trouble-free press operation

F. Increases production

G. Insures good image transfer

H. Provides opportunity to locate and correct potential problems on a scheduled basis rather than during a production breakdown

I. Helps operator to be aware of potential problems

J. Helps operator to become more familiar with press mechanical functions

K. Helps operator to identify and correct troubles

L. Presents an impressive, organized work station for view by the employer, customers, or visitors

III. Areas of work in a preventive maintenance program

A. *Cleaning* equipment and work area

B. *Lubricating* equipment

INFORMATION SHEET

C. *Adjusting* operator controllable settings on equipment

IV. Preventive maintenance schedules

A. Daily—The regular cleaning that takes place after a day's run; the most important of the preventive maintenance schedules

B. Weekly—Usually takes place at the end of the work week; designed for blanket rotation or protection of other press elements while the press is not in use

(NOTE: This also includes biweekly maintenance.)

C. Monthly—Supplements daily and weekly cleaning and includes a complete cleaning of the total press from the top to the floor

V. Requirements for a preventive maintenance schedule in chart form (Transparency 1)

A. A preventive maintenance chart should include the three categories of work: cleaning, lubricating, and adjusting.

B. Each category should have columns for listing the time when work should be done: daily, weekly/bi-weekly, or monthly.

C. Each maintenance activity on the chart should have a block for marking the date when maintenance was performed.

D. The operator's manual and other manufacturer's guides should be referenced for lubrication and adjustments.

E. The back side of the PM chart should provide space to log the date problems occur, what the problems are, and how the problems are solved.

(NOTE: The PM schedule presented in TM 1 is a suggested format; in an actual working situation or in the classroom, the format may have to be modified to meet the needs of specific equipment in the workplace.)

VI. Preventive maintenance procedures for daily cleanup

(CAUTION: When press is under operation for automatic cleaning, all safety precautions should be observed; when manual cleaning takes place, the power plug should be removed from its receptacle and only one operator should be at the press.)

A. Ink system

1. Use the blanket wash normally used for cleaning the blanket during the press run to clean ink rollers.
2. Remove ink and follow cleanup procedure for all parts of the inking system.

INFORMATION SHEET

B. Dampening system

(NOTE: At best, molleton covers or sleeves will pick up some ink from the plate, but do not allow this ink to dry on roller surface.)

1. Wipe ink particles from roller cover using a cotton pad dampened with fountain solution, or
2. Remove covered rollers from press and loosen ink with blanket wash, then flush blanket wash from cover with running water.
3. Remove excess moisture from cover by rolling the roller with open palms on top of paper towels on a flat surface.
4. Clean metal dampening rollers with plate cleaner or a water miscible cleaner or pumice powder and water to remove all ink, oil, or residue that repels water.
5. A coating of gum arabic solution may be applied to metal rollers after cleaning.
6. Change dampening roller cover if enough ink has been trapped on the surface to form an ink glaze that appears shiny.

   (NOTE: On presses with integrated ink and water systems, there are no molleton covered rollers; if water fountain roller runs coated with ink, then dampening rollers will be cleaned by running in contact with ink rollers; if water fountain roller runs free of ink coating, then water fountain and ductor rollers must be cleaned separately from ink rollers.)

C. Cylinders

1. Use plate cleaner or nonabrasive water miscible cleaner on plate cylinder, then coat with plate etch.
2. Thoroughly clean blanket with blanket wash and water, then clean blanket cylinder ends and dry blanket.
3. Wipe ink from surface of impression cylinder with plate etch, or remove ink with blanket wash or deglazer, then clean with plate cleaner, degreaser, or water miscible cleaner, then coat with etch.

D. Press

1. Use a shop towel dampened with blanket wash.
2. Wipe ink, paper lint, dust, and oil from side covers, side frames, support bars, cam shafts, and gear shafts.

INFORMATION SHEET

E. Work station

1. Clean work table surface.
2. Clean chemical shelf; wipe containers.
3. Place dirty shop towels in safety can.
4. Place all waste paper in trash can.
5. Arrange work station in orderly manner.

VII. Preventive maintenance procedures for weekly cleanup

A. Deglaze ink rollers and offset blanket.

B. Change blanket if rotation plan is followed.

C. Desensitize noncovered dampening rollers.

D. Degrease plate and impression cylinder surfaces.

(NOTE: If blankets are not rotated, a good practice is to remove the blanket after cleaning, coat it with blanket powder, and leave it off the press over the weekend.)

E. Clean ink ductor cam truck or follower.

F. Clean plate clamps.

G. Clean delivery stripping rollers and rings or chain delivery clamps and paper turning wheels.

H. Wipe oil and dirt off floor area under press.

I. Clean and/or wash vacuum pump filters according to operator's manual.

(NOTE: Procedure may be necessary daily if fluffy or dusty paper is being run.)

VIII. Preventive maintenance procedures for monthly cleanup

A. Unplug the power supply.

B. Remove all safety and dust covers.

C. Begin at the top of the press and work to the bottom of the press to remove all paper lint and dust from the total press.

(CAUTION: Use an air compressor when one is available, but be sure to wear eye protection when compressed air is used in cleaning.)

INFORMATION SHEET

D. Clean oil, ink, paper particles, and dirt from vacuum and drive motors, side frames, cams, gears, levers, shafts, cylinder ends, and all hard-to-reach areas of the press.

E. Flush press vacuum pump with a mixture of solvent and oil.

(CAUTION: Most modern press designs use a carbon-vane vacuum pump which requires no backflushing. In fact, operator manuals for these presses strongly warn against using solvent and oil mixtures, which can severely damage such pumps. Carbon-vane pumps need only a periodic, usually weekly, cleaning of air filters. Always be certain to follow your press manufacturer's specifications for vacuum pump maintenance to avoid costly mistakes.)

F. Clean vacuum and air blast filters, hoses, and air passages.

G. Clean upper and lower paper pull-out rollers or forwarding rollers.

H. Clean upper and lower paper feed rollers.

IX. Procedures for daily, weekly and monthly lubrication

(NOTE: Parts should be lubricated **after** cleaning procedures are completed.)

A. Unplug the power supply; never lubricate a press while it is running.

B. Use lubricants recommended by the manufacturer; do not use motor oil for machine lubrication.

(NOTE: Filling a reservoir may require a quantity of lubricant, but in all other cases use lubricant sparingly because too much lubricant may cause more problems than too little lubricant.)

C. Lubricate all friction points of exposed fast turning parts daily; the best time is just before beginning the day's run.

D. Lubricate all friction points of all exposed moving parts weekly.

E. Monthly lubrication should follow monthly cleanup before covers are replaced.

F. Lubricate all friction points monthly as designated by manufacturer's lubrication chart.

(NOTE: The manufacturer may not list all of the areas needing lubrication, so the operator should observe and lubricate all points of friction.)

G. Fill vacuum pump oil bottle to designated level each month.

(NOTE: Be certain to check manufacturer's maintenance specifications for lubrication and lubricants. Some presses use a central, pressurized lubrication system which meets the needs of the vacuum pump. Severe damage can result if manufacturer's recommendations are not followed.)

INFORMATION SHEET

X. Daily and weekly adjustment procedures

(CAUTION: Do not make adjustments without specific permission from your instructor; then refer to operator's manual, maintenance manual, or your instructor for settings.)

A. Student should not make adjustments until approved as an operator by the instructor.

B. Adjustments should be made as necessary to make-ready for each job order and should be made at will as needed.

(NOTE: Routine operator adjustments may require the operator to square image on sheet, move image side to side, raise or lower image vertically, increase or decrease ink flow, increase or decrease water flow, feeder set-up, delivery set-up, register board set-up, air blast, vacuum, set-off powder and impression cylinder pressure.)

C. Weekly adjustment should be those necessary to troubleshoot and solve problems.

XI. Monthly adjustment requirements

A. Make an ink form roller check.

B. Adjust dampener rollers to plate cylinder.

(NOTE: Procedures for adjustments on various presses are outlined in Job Sheet #1.)

C. Adjust ink form rollers to plate cylinder.

(NOTE: Procedures for adjustments on various presses are outlined in Job Sheet #2.)

D. Adjust plate cylinder to blanket cylinder.

(NOTE: Procedures for adjustments on various presses are outlined in Job Sheet #3.)

E. Adjust blanket cylinder to impression cylinder.

(NOTE: Procedures for adjustments on various presses are outlined in Job Sheet #4.)

INFORMATION SHEET

XII. Steps in making an ink form roller check

(NOTE: To assure proper ink laydown and prevent plate wear, a check should be made of the ink form roller pressure on the plate cylinder; this procedure is applicable to most situations.)

A. Ink up the press.

B. Gently drop the ink form rollers to the plate, then lift them.

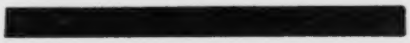
C. Turn the handwheel to bring the plate around for inspection.

D. Uniform stripes of ink 1/8" to 3/16" wide indicate proper adjustment.

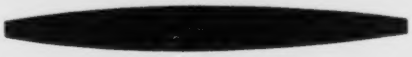
E. Irregular ink stripes indicate either uneven settings or worn rollers, and adjustments should be made to correct the problem.

XIII. Ink stripe configurations and their significance

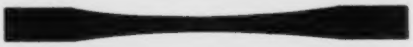
A. Ideal setting—Uniform ink stripe 1/8" to 3/16" wide indicates proper adjustment.



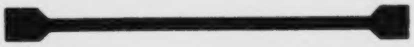
B. Roller worn at ends—Caused by form roller being set too tightly to oscillator roller; correct by resetting rollers or replacing them if desired setting cannot be obtained.



C. Low area in center—Indicates improper grinding or improper manufacture and should be replaced.



D. Roller swollen at ends—Results from continuously setting roller too tightly and should be replaced.



INFORMATION SHEET

E. Setting uneven—Too heavy on one end and too light on the other end; adjust rollers.

[redacted]

XIV. Sequence of troubleshooting technique

A. Make no assumptions.

B. Look for the simple cause and the simple solution.

(NOTE: The solution may be as simple as plugging in the power cord.)

C. Identify specific symptoms of the problem.

D. List the probable causes.

E. List possible solutions for each cause.

(NOTE: Refer to operator's or maintenance manuals.)

(CAUTION: Adjustments should be made only with the power off and with the approval of your instructor.)

XV. Categories of press troubles

A. Operator

(NOTE: The majority of problems are operator caused; they occur because of lack of knowledge, neglect, or carelessness.)

B. Chemistry and ink

C. Paper stock

D. Image transfer process

E. Mechanical

XVI. Types of emulsification

A. Excess water in ink—Causes ink to pile on rollers, plate and/or blanket producing a grayed image on sheet

(NOTE: Small amounts of water mixing into ink during the run normally cause little harm.)

B. Excess ink in water—Produces overall tint in background area on the printed sheet

INFORMATION SHEET

XVII. **Technique for avoiding emulsification**—Run the minimum amount of ink to give the job full color and the minimum amount of dampening solution to keep the plate clean.

XVIII. **Conditions that create ink drying problems**

A. Relative humidity

B. Too much moisture run on the press

C. pH of fountain solution

(NOTE: As pH value drops below 4.0, drying time increases significantly until a pH of 2.0 would take approximately 4 times the drying time on a typical offset paper.)

D. Type of printing paper (absorbency)

E. pH of printing paper

(NOTE: The pH of the paper stock becomes significant when the relative humidity is above 60%, especially on coated stock. Inks dry normally on uncoated papers having pH values above 4.5.)

F. Lack of oxygen

(NOTE: When running heavy solids, there may not be enough oxygen between sheets on the delivery pile to facilitate drying.

G. Temperature

XIX. **Common ink problems on the press**

A. Set-off—Ink is transferred from the front surface of one sheet to the back surface of the sheet above in the delivery pile.

B. Chalking—Ink on the paper turns dry and powdery.

C. Trapping—Ability of an ink to print over a previously applied ink is impaired

D. Tinting—Emulsified ink suspended in the fountain solution on the plate surface appears as a uniform tint on the printed sheet.

E. Scumming—Plate picks up ink in the clear areas and transfers it to the clear areas of the sheet.

F. Piling—Ink builds up or piles on rollers, plate, and/or blanket.

INFORMATION SHEET

G. Picking—Ink tears away parts of the paper coating as the sheet is printed; these appear as black spots in the blank areas of the printed sheet and white spots in the solid areas.

H. Misting—Ink flies into the atmosphere as fine mist, especially at high temperature and speed.

1. Toning—Ink adheres to nonimage area of plate because of lack of dampening and transfers to printed sheet.

XX. Guidelines for evaluating good print quality (Transparency 2)

(NOTE: The following is adapted from materials published by the 3M Company.)

A. Crisp, dark lines and solids

B. A clean background

C. Clean halftones, screens, and reverses

D. Good registration

E. Each sheet dried completely

XXI. Print quality problems and their causes

(NOTE: The following is adapted from materials published by the 3M Company.)

A. Scumming—Background dirty because of too much ink, not enough moisture, dirty dampener roll covers, or dampener covers tied too tightly on ends (Transparency 3)

B. Gray, washed out—Not enough ink, too much moisture, wrong color of ink, incorrect dampener form roller pressure, incorrect plate-to-blanket pressure, or incorrect impression-to-blanket pressure (Transparency 4)

C. Gray, washed out dirty background—Glazed ink rollers, glazed blanket, too much ink form roller pressure, or too much dampener form roller pressure (Transparency 5)

D. Copy too dark—Too much ink, too much impression-to-blanket pressure, not enough plate-to-blanket pressure, or too many revolutions on blanket without paper going through causing build up on blanket (Transparency 6)

INFORMATION SHEET

E. Uneven printing—Incorrect ink distribution, glazed rollers, incorrect dampener form roller parallel pressure, poor paper surface, incorrect ink form roller parallel pressure, incorrect plate-to-blanket parallel pressure, incorrect impression-to-blanket parallel pressure, or dirty impression cylinder (Transparency 7)

F. Double image (blurred copy)—Loose blanket, too much ink and fountain solution, not enough plate-to-blanket pressure, loose plate, or incorrect impression-to-blanket pressure (Transparency 8)

G. Weak spots (spotty copy)—Incorrect plate-to-blanket pressure, incorrect impression-to-blanket pressure, low spots in blanket, tacky ink, tacky blanket, dirty impression cylinder, or blind image on plate caused by dried gum or too strong fountain solution (Transparency 9)

H. Image breakdown during run—Too much dampening form roller pressure, too much ink form roller pressure, too much plate-to-blanket pressure, fountain solution too strong, or end play in form rollers (Transparency 10)

I. Streaking—Incorrect ink form roller pressure, incorrect dampener form roller pressure, incorrect plate-to-blanket pressure, incorrect impression-to-blanket pressure, improper ink, or loose blanket (Transparency 11)

J. Improper register—Loose blanket, side guides not set properly, paper not cut straight, or cam band not set (Transparency 12)

K. No image at all—Not enough ink roller form pressure, not enough plate-to-blanket pressure, not enough impression-to-blanket pressure, too much moisture, glazed blanket, or glazed ink rolls (Transparency 13)

L. Paper curling in receiver—Too much moisture or a curl in the paper (Transparency 14)

M. Paper nicking on edge—Paper stop fingers too high, feed rollers not set properly, or paper hitting back stop in receiver too hard (Transparency 15)

N. Paper missing grippers—Stop fingers incorrectly set or feed rollers out of adjustment (Transparency 16)

O. Paper wrinkling—Too much moisture, paper damp, too much pressure between blanket and impression cylinder, or register board not set properly (Transparency 17)

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

STUDENT SUPPLEMENT 1—TROUBLESHOOTING GUIDE FOR INK AND DAMPENING PROBLEMS

(NOTE: The following is adapted from material published by the 3M Company.)

PROBLEM	CAUSE	SOLUTION
Ink Set-Off in Delivery Pile	Too much ink on paper	Readjust ink settings.
	Too much acid in fountain solution	A low pH retards drying. Test pH of solution. If not between 3.8 and 5.5, adjust accordingly.
	Wrong ink for stock	Contact ink supplier.
	Not enough drier in ink	Increase drier content. Contact ink supplier for correct drier.
	Paper coating of poor quality	Use paper of better quality.
	Ink too stiff, causing absorption problems	Add light varnish to ink.
	Delivery pile too high	Reduce lift height.
	Pressman bends paper pile when removing from press	Use skid under pile and lift paper by skid load only.
	Pressroom humidity high	Close windows, increase room temperature.
	Running with too much water	Run with minimum ink and water.
	Static in the delivery pile attracting sheets to each other	Increase pressroom humidity. Pre-condition paper to pressroom conditions. Use a tinsel static eliminator across delivery areas so paper contacts it. Use commercial static eliminators.
	Not enough or improper spray powder	Increase amount of spray powder or increase the particle size of spray powder.

STUDENT SUPPLEMENT 1

PROBLEM	CAUSE	SOLUTION
Ink Chalking	Ink vehicle absorbed by paper before ink has time to set properly on paper surface	Add a binding base to control absorption by paper.
	Not enough drier in ink	Add drier to ink. Check with ink supplier for correct drier.
	Job printed with wrong ink for stock used	Over-print with varnish.
Ink Trapping (ink does not adhere to previously printed color)	Ink dries hard before next color	Run all colors as quickly as possible without risking ink set-off.
	Ink tack incorrect	Consult ink supplier.
	Wrong drier used on first color down	Use different drier on first color. Consult ink supplier.
Tinting/Catch Up (ink can be wiped from plate)	Emulsified ink suspended in the fountain solution appears as a uniform tint on the printed sheet	Smear small amount of ink on glass. Place several drops of fountain concentrate on ink. Rub together with finger. If two mix readily, the ink is faulty. Wash-up and replace ink.
	Alkaline or proteinous paper, causing ink emulsification	Adjust fountain pH to needs of paper. Check paper; change if necessary.
	Fountain solution	If pH is above 6.0, tinting can result. Readjust pH of fountain. Allow dampeners to become completely wet before printing.
	Lack of water	Set top dampener lighter than lower. Ductor not contacting pan roller firmly. Reset. Ductor roller covering compressed and dirty. Clean or replace. Adjust ductor-to-vibrator roller to a firm pressure. Clean and etch pan roller and recover if slimy and dirty. Increase dwell time of ductor roller on pan roller. Check for low spots in dampening rollers—correct. Dirty dampeners—clean.

STUDENT SUPPLEMENT 1

PROBLEM	CAUSE	SOLUTION
Tinting/ Catch Up (cont'd)	Excessive ink	Reduce ink level and allow adequate time for adjustment to take full effect.
	Poor (weak) varnish ink	Replace with better ink.
	Breakdown of pigment particles in the ink	Ink may be at fault. Notify the the ink manufacturer. May need reformulated ink.
	Acid getting into ink from an improperly washed-out plate	Wash up press. Replace ink. Reprocess the plate.
Scumming or Tinting	Plate or press condition	"Wet hone" plate in problem area. If honed area continues to take ink, the problem is tinting caused by an inking problem on the press. If area stays clean it is scumming caused by plate sensitivity.
Scumming	Sensitive plate	Desensitize.
	Highly bichromated fountain solution	Check solution and re-mix if necessary.
	Plate exposed to light after fountain solution allowed to dry on it	Desensitize or re-make plate.
	Excessive printing pressure could indirectly cause scum	Check cylinder pressures, adjust as needed.
	Paper or ink causing plate sensitivity	Check out paper and ink.
	Negative plate improperly desensitized or lightstruck	Desensitize or re-make plate.
	Positive plate underexposed; water on plate during developing/fixing; improperly desensitized	Re-make plate.
	Ink form roller setting	Check ink form roller setting to the vibrator roller and to the plate. The vibrator roller should drive the ink form roller and not the plate.

STUDENT SUPPLEMENT 1

PROBLEM	CAUSE	SOLUTION
Scumming (cont'd)	Fountain solution too weak or improperly mixed	Increase strength or remix.
	Ink sensitizing plate background beyond image area	Densensitize with plate cleaner-conditioner.
	Glazed offset blanket	Clean all gum, spray, paper sizing, etc. from blanket with deglazer and pumice.
	Low alcohol content	Bring to correct concentration.
Ink Piling on Rollers	Too much water	Check to adjust all dampener settings.
	Ink too short	Add longer varnish.
	Coating from paper	Use another stock.
Toning	Out of fountain solution.	Add fountain solution.
	Dampening form roller pressure too light	Increase pressure.
	Too little fountain solution being run	Increase quantity.
	Dampening form roller cover dirty	Clean cover. Change cover.
Picking and Hickies (defects in printed image caused by dried ink, dirt or paper fibers on plate and blanket)	Worn or cracked rollers deposit tiny particles of dry ink onto plate	Remove from press and clean thoroughly. Regrind or replace if necessary.
	Lint, gum, dried ink skin, etc., in ink fountain	Use lintless dampeners. Clean inking system; use fresh ink.
	Dirt or dust on paper	Fan sheets thoroughly. Wipe edges of paper load with glycerin. Vacuum load edges. Be sure slitter knife in paper cutter is sharp. Be sure stock was back-trimmed (cut with correct edge of knife). Inspect sheet cleaning equipment.
	Weak paper surface	Use ink and paper suited to each other.

STUDENT SUPPLEMENT 1

PROBLEM	CAUSE	SOLUTION
Picking and Hickies (cont'd)	Dirty plate	Wash plate before resuming the run. Visually check to be sure no specks or particles are still clinging to its surface.
	Tacky blanket	Wash blanket. Apply sulfur powder.
	High ink tack	Reduce tack slightly. Do not use more than 1/2 oz. reducer per lb. of ink. Do not allow press to stand idle too long allowing tack of ink to increase. Add varnish or lubricant to non-printing areas of rollers.
	Excessive blanket to impression pressure	Decrease pressure between the blanket and impression cylinders.
	High press speed	Reduce press speed.
	Excess water reaching stock	Run with minimum water.
	Heavy form	Run light forms first.
Ink Misting (flies into atmosphere as fine mist)	Ink too soft	Add heavier varnish to ink.
	Ink rollers are nicked or out-of-round	Inspect all rollers and replace defective ones.
	Too much ink	Reduce ink fountain settings.
	If dots appear on press parts, ink is too thin	Add mixing white and heavy varnish. Use a heavier ink.
	If little ink lines appear on press parts, ink is too thick	Add thin varnish.
	Ink rollers set too tightly	Re-set ink rollers.
	Ink rollers too hard	Replace rollers.
	Ink rollers swollen	Use a more volatile press wash. Reset the rollers.
	Ink rollers too soft	Replace the rollers.

STUDENT SUPPLEMENT 1

PROBLEM	CAUSE	SOLUTION
Ink Roller Stripping (rollers do not accept ink)	Fountain solution too acid	Test pH of solution. If it is not between 3.8 and 5.5, adjust accordingly.
	Glazed form roller	Remove from press and deglaze and pumice. Rinse thoroughly.
	Too much water being run	Cut back water at fountain.
	Desensitized metal vibrator rollers	Clean rollers, copperize, wash thoroughly. Then reink rollers and wash again before using.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

STUDENT SUPPLEMENT 2—TROUBLESHOOTING GUIDE FOR PAPER STOCK PROBLEMS

(NOTE: The following is adapted from material published by the 3M Company.)

PROBLEM	CAUSE	SOLUTION
Paper Curling	Too much water	Run with minimum water.
	Paper not properly conditioned	Condition paper to pressroom conditions.
	Room humidity not constant	Install proper controls.
	Heavy copy at end of form	Reverse plate if possible.
	High ink tack	Reduce tack of ink with reducing varnish
	Excess blanket to impression cylinder pressure	Reduce impression setting.
Paper Rolls into Delivery Tray	Short grain stock	Set ejector rollers and rings. Slow press. Change to long grain.
	Ejector rollers and rings not set properly	Set ejector rollers near edges of sheet with rings just outside rollers.
Sheet Wrinkle (gripper edge to trailing edge)	Excess blanket to impression cylinder pressure	Reduce pressure.
	Excess or uneven feed roll pressure	Reduce pressure.
	Excess sheet edge moisture; unwrapped stock left in high humidity area	Allow paper stock to adjust to room humidity. Open packages of stock and use immediately.
	Sheet not fed correctly	Check stack height, sheet guides, air blast and vacuum.
Sheet Lead Edge Corner Folded	Stack height on feeder not correct (usually too low)	Set stack height to sucker feet for weight of stock being fed.
	Sheets not square on feed table	Adjust paper guides to hold sheet square to front plate.
	Pullout rollers set too close to sheet edge	Move pullout rollers toward center of sheet.
	Paper not square in register position	Set side register guides to hold sheet square.
	Uneven feed roll pressure	Check pressure, adjust for equal pressure end to end.

STUDENT SUPPLEMENT 2

PROBLEM	CAUSE	SOLUTION
Paper Nicking on Lead Edge	Paper stop fingers too high	Adjust fingers to clear as feed roller touches paper.
	Feed roller not timed correctly (contacting paper before stop fingers move)	Adjust cam to retard feed roller.
	Too much feed roller pressure	Reduce feed roller pressure.
	Paper hitting back stop in receiver too hard	Set paper bail to slow sheet travel. Make sure paper strikes back stop squarely.
	Chain delivery grippers not timed correctly with impression cylinder	Set gripper opening on each chain bar, then set chain timing with cylinder.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

STUDENT SUPPLEMENT 3—TROUBLESHOOTING GUIDE FOR PROCESS (IMAGE TRANSFER) PROBLEMS

(NOTE: The following is adapted from material published by the 3M Company.)

PROBLEM	CAUSE	SOLUTION
Plate Inks up Solid	**No fountain solution**	**Add fountain solution.**
	Dampening form roller not on	**Turn roller on.**
	Dampening form roller not adjusted properly (too little pressure)	**Adjust dampening form roller.**
	Obstruction holding dampening form roller off plate	**Remove or correct obstruction.**
Plate Will Not Take Ink in Image Area (blind plate)	**Gum not removed from plate surface**	**Remove gum.**
	Ink form rollers not on	**Turn rollers on.**
	Incorrect ink form roller pressure	**Set rollers to correct pressure.**
	Too much acid in fountain solution	**Keep pH factor between 3.8 and 5.5 (prevents gum from desensitizing plate image).**
	Emulsified ink (ink loses its ability to protect image from gum arabic; often accompanied by roller stripping and/or washed out copy)	**Change to better ink, clean rubber rollers, raise pH of fountain, clean metal rollers if stripping.**
	Too much gum arabic in fountain solution	**Gum content should be kept at one ounce or less per gallon of fountain solution.**
	Detergent in water, sponge, dampeners or ductor reaching plate image	**Thoroughly rinse ductor and dampener rollers with one ounce fountain concentrate to a gallon of water before installing on press.**
	Plate cleaners or scratch removers dried on plate image	**Always rinse plate thoroughly immediately after application.**
	Ink lacking tack will not adhere to image	**Consult ink supplier.**

STUDENT SUPPLEMENT 3

PROBLEM	CAUSE	SOLUTION
Plate will not Run Clean	Plate surface oxidized	Clean with scratch remover. Make new plate.
	Too much ink	Reduce amount of ink on rollers.
	Contaminated fountain solution	Make fresh fountain solution.
	Incorrect dampening form roller pressure	Adjust roller pressure.
	Out-of-date plate or contaminated plate	Make new plate. Open new box of plates.
	Bad negative causing background area exposure on plate	Opaque negative. Remake negative. Make new plate.
	Emulsified ink on form rollers	Wash press and reink.
Printed Image Has Overall Faded Appearance	Plate image blinding (too much acid in fountain solution)	Mix fresh fountain solution.
	Too much fountain solution being run	Reduce quantity.
	Too little ink being run	Increase ink feed.
	Emulsified ink on form rollers	Wash ink system, reink.
	Glazed ink rollers	Deglaze; reink.
	Glazed blanket	Deglaze blanket.
	Ink form roller pressure incorrect (too light)	Set correct pressure—increase.
	Dampening form roller pressure incorrect (too heavy)	Set correct pressure—decrease.
	Plate to blanket cylinder pressure too light	Increase pressure.
	Blanket to impression cylinder pressure too light	Increase pressure.

STUDENT SUPPLEMENT 3

PROBLEM	CAUSE	SOLUTION
Weak or Open Areas in Printed Image	Plate worn	Redevelop plate. Make new plate.
	Plate to blanket cylinder pressure too light	Increase pressure.
	Blanket to impression cylinder pressure too light	Increase pressure.
	Damaged blanket	Apply blanket fix to swell area. Remove blanket and roll out damaged area. Change blanket.
	Paper particle buildup on blanket	Clean blanket with blanket wash and water miscible cleaner.
	Irregular stock surface	Increase blanket to impression cylinder pressure. Change stock.
Double Image (Ghost Image) on Printed Sheet	Loose plate	Tighten plate tail clamp.
	Loose blanket	Tighten blanket (be careful to tighten evenly).
	Too much plate to blanket cylinder pressure	Decrease pressure.
	Too much blanket to impression cylinder pressure	Decrease pressure.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

STUDENT SUPPLEMENT 4—TROUBLESHOOTING GUIDE FOR MECHANICAL PROBLEMS

(NOTE: The following is adapted from material published by the 3M Company.)

PROBLEM	CAUSE	SOLUTION
Press Will Not Turn On	**Disconnected from power source**	**Plug in cord. Replace fuse. Repair connection.**
	Power switch not operative	**Reattach loose wires. Repair or replace switch.**
Paper Will Not Feed	**Vacuum pump not on**	**Turn switch on. Repair loose or broken wires. Replace switch.**
	No vacuum or air blast (pump drive motor on)	**Check pump drive belt (replace if broken).**
	No vacuum or air blast at feeder (pump is on)	**Repair or replace broken or leaking hose. Loosen sticking pump vanes (flush with mixture of oil and solvent).**
	Feeder lever not operative	**Replace loose or broken spring. Tighten loose screws.**
	Paper stack too high or too low	**Check feed table release. Set stack height for stock being fed. Correct stack height feelers.**
	Paper guides too tight	**Set guides to touch sheet edges but not bind.**
	Sucker feet worn	**Replace rubber feet.**
	Sucker tubes open	**Close off tubes not in use.**
Paper Skip-Feeds	**Stack height not correct**	**Set stack height for stock being fed.**
	Paper guides too tight	**Set guides to touch edges of sheet but not bind.**
	Paper weight too far forward for stock being fed	**Move weight back.**
	Air blast setting not correct	**Increase air blast.**
	Vacuum setting not correct	**Increase vacuum.**

STUDENT SUPPLEMENT 4

PROBLEM	CAUSE	SOLUTION
Paper Skip-Feeds (cont'd)	Sucker tubes not in use are open	Cover tubes not in use.
	Heavy paper stock	Increase vacuum. Increase air blast. Loosen trailing edge paper guide.
	Paper edges sticking together (dull cutter blade)	Remove stock, fan on all four sides. Restack on feeder.
Feeding Two or More Sheets	Stack height not correct	Set stack height for stock being fed.
	Too much air blast	Decrease air blast.
	Too much vacuum	Decrease vacuum.
	Paper weight too far back	Move weight forward.
	Paper guides loose (especially trailing edge guide)	Set guides to touch sheet edges but not bind.
	Sheet separators bent out of shape	Reshape separators.
Feed Table Will Not Lift	Lowering release latch not reset	Reset latch.
	Stack height control setting incorrect	Set for stock being fed.
	Lift adjustment incorrect	Set lift mechanism to engage lift gear.
	Obstruction blocking lift mechanism	Locate and remove obstruction.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

ASSIGNMENT SHEET #1—USE A TROUBLESHOOTING GUIDE TO FIND THE BEST SOLUTION TO AN INK AND DAMPENING PROBLEM

Name ________________________________ Overall rating ____________

Evaluation Criteria	**Rating**
• Directions were followed	______
• Printing conditions correctly identified	______
• Problems and solutions correctly listed	______

Directions: Your instructor will provide you with a view of a transparency (TM 3) or a handout example of a printing job containing an ink and dampening problem. Use the Troubleshooting Guide for Ink and Dampening Problems (Student Supplement #1) to complete the following information:

1. Identify the printing condition of the example by name.

   ____

ASSIGNMENT SHEET #1

2. List at least six possible problems in the ink and dampening system which would cause the results seen in the example, and give possible solutions to these problems. Record your answers in the following chart.

Possible Problems	Possible Solutions

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

ASSIGNMENT SHEET #2—USE A TROUBLESHOOTING GUIDE TO FIND THE BEST SOLUTION TO A PAPER STOCK PROBLEM

Name ______________________ Overall rating __________

Evaluation Criteria	Rating
• Directions were followed	______
• Printing conditions correctly identified	______
• Problems and solutions correctly listed	______

Directions: Your instructor will provide you with a view of a transparency (TM 14) or a handout example of a printing job containing a paper stock problem. Use the Troubleshooting Guide for Paper Stock Problems (Student Supplement #2) to complete the following information:

1. Identify the printing condition of the example by name.

____

ASSIGNMENT SHEET #2

2. List at least six possible problems with paper stock which would cause the results seen in the example, and give possible solutions to these problems. Record your answers in the following chart.

Possible Problems	Possible Solutions

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
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ASSIGNMENT SHEET #3—USE A TROUBLESHOOTING GUIDE TO FIND THE BEST SOLUTION TO A PROCESS PROBLEM

Name ________________________________ Overall rating ____________

Evaluation Criteria	**Rating**
• Directions were followed	______
• Printing conditions correctly identified	______
• Problems and solutions correctly listed	______

Directions: Your instructor will provide you with a view of a transparency (TM 9) or a handout example of a printing job containing a process problem. Use the Troubleshooting Guide for Process (Image Transfer) Problems (Student Supplement #3) to complete the following information:

1. Identify the printing condition of the example by name.

   ____

ASSIGNMENT SHEET #3

2. List at least six possible problems with process (image transfer) which would cause the results seen in the example, and give possible solutions to these problems. Record your answers in the following chart.

Possible Problems	Possible Solutions

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

ASSIGNMENT SHEET #4—USE A TROUBLESHOOTING GUIDE TO FIND THE BEST SOLUTION TO A MECHANICAL PROBLEM

Name ______________________________ Overall rating __________

Evaluation Criteria	**Rating**
• Directions were followed	_____
• Problem cited and possible solution outlined	_____

Directions: Your instructor will provide you with a press adjusted so as not to allow paper to feed. Use the Troubleshooting Guide for Mechanical Problems (Student Supplement #4) to complete the following steps:

1. Locate and identify the problem—do not correct it.

2. Write down the problem and possible solution and turn in your answer to the instructor.

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PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
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ASSIGNMENT SHEET #5—DETERMINE LUBRICATION REQUIREMENTS FOR A SPECIFIC PRESS

Name ______________________________ Overall rating ____________

Evaluation Criteria	**Rating**
• Directions followed	______
• Lubrication points correctly listed and labeled	______

Directions: Your instructor will provide you with a manufacturer's manual and a lubrication chart for a specific press; from this information, and with your instructor's guidance, complete the following information:

A. List daily lubrication points.

B. List weekly/bi-weekly lubrication points.

C. List monthly lubrication points.

(NOTE: Retain your list for use in completing Assignment Sheet E6.)

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
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ASSIGNMENT SHEET #6—SET UP A PREVENTIVE MAINTENANCE SCHEDULE IN CHART FORM

Name ______________________________ Overall rating __________

Evaluation Criteria	**Rating**
• Directions followed	______
• Preventive maintenance schedule correctly listed	______

Directions: Use the suggested format in TM 1 as a guide and set up a preventive maintenance schedule in chart form for a specific piece of equipment as selected by your instructor and a specific list of items to be checked as assigned by your instructor. Information obtained for Assignment Sheet #5 may be used if your instructor so directs.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

ASSIGNMENT SHEET #7—TAKE AN INVENTORY OF SPARE PARTS

Name ______________________________ Overall rating ____________

Evaluation Criteria	**Rating**
• Directions were followed	______
• List accurately prepared	______

Directions: Your instructor will assign you a press and a collection of spare parts. Identify the parts, count them and make a list of what and how many items you have. Turn in your list to the instructor.

PRESS: ____

Name of Part	**How Many**

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
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JOB SHEET #1—ADJUST DAMPENER ROLLERS TO PLATE CYLINDER

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Dampener rollers to plate cylinder adjusted properly according to operator's manual	_____

Introduction: This exercise is aimed at familiarizing the student with press adjustments to provide proper roller pressures.

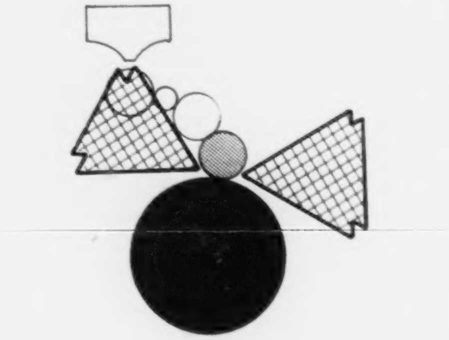
A. Tools and equipment

1. 1-inch wide strips of 20-lb bond paper or two .005 3M dampening gauges
2. Screwdriver
3. Allen wrench, if required
4. Box end wrench or adjustable wrench
5. Adjustment wrench, if required
6. Operator and/or maintenance manual for selected duplicator

JOB SHEET #1

B. Procedure (Figure 1)

FIGURE 1



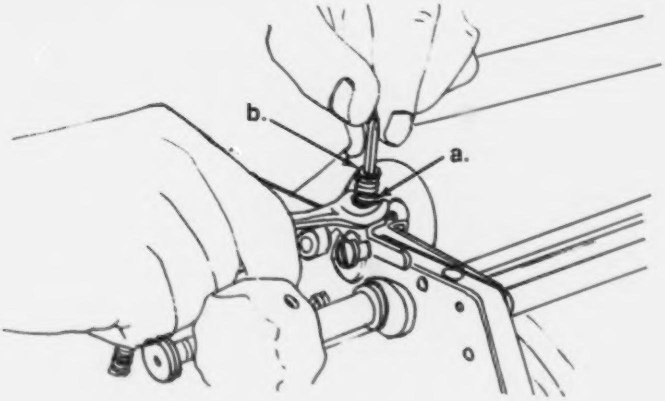
(NOTE: It is important to have equal pressure at all points between the dampening roller and the plate cylinder; depending on the duplicator or duplicators available, your instructor may direct you to complete all or some of the procedures outlined or use the procedures as guidelines for a selected duplicator; these procedures are adapted from materials published by the 3M Company.)

1. Mount a plate on the plate cylinder.
2. Place two 1-inch-wide strips of 20-lb bond paper or two .005 3M dampening gauges between the roller and the plate.
3. Put the roller in the **ON** position and slowly pull on the strips.
4. Determine if the pull on the strips is uneven; this means the roller is not parallel with the plate cylinder.
5. Determine if the pull on the strips is too heavy or too easy; this means the overall pressure between the roller and plate cylinder must be adjusted.
6. Adjust the dampener rollers on an ATF Chief 15 or Chief 17 with the following procedure (Figure 2):
    a. Loosen locking nut (a).
    b. Turn the dampener form roller adjusting screw (b) clockwise if the test strip is too tight or counterclockwise if too loose.
    c. Tighten locking nut (a).

JOB SHEET #1

d. Repeat the paper test to make sure that the proper amount of adjustment has been made.

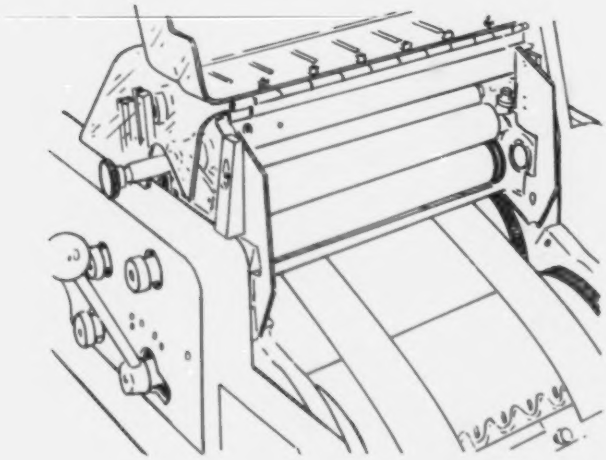
FIGURE 2



(Courtesy American Type Founders, Inc.)

7. Adjust the dampener rollers on a Multilith 1250 Offset only with the guidance of your instructor or Multigraphics service representative (Figure 3):

FIGURE 3



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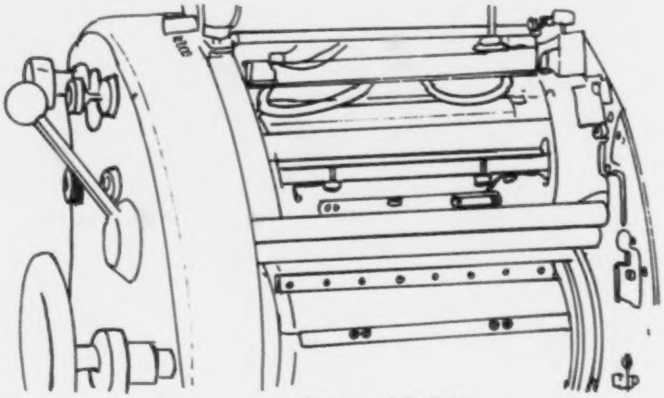
JOB SHEET #1

8. Adjust the gap between the aquamatic oscillator and the aquamatic ductor roller on an A.B. Dick 360 only under the careful guidance of your instructor or watch the procedure as it is performed by an A.B. Dick service representative (Figure 4).

FIGURE 4

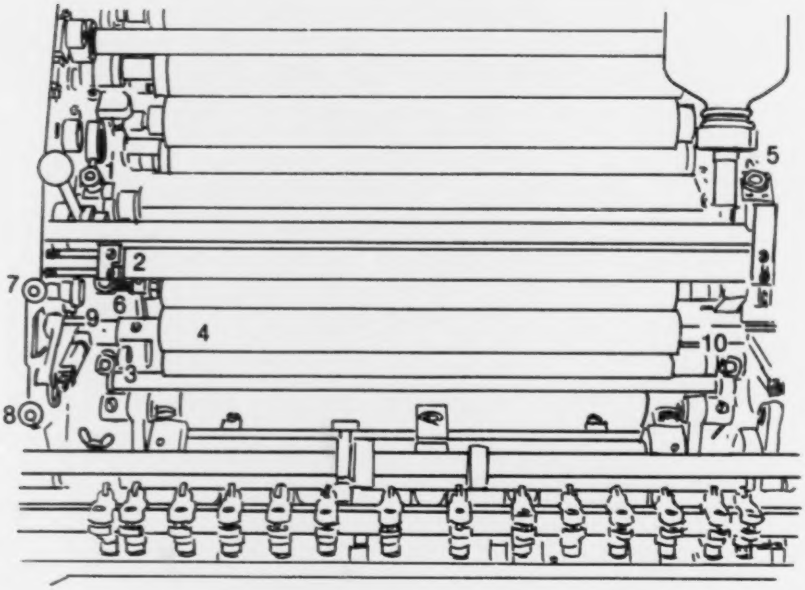


(Courtesy A.B. Dick)

JOB SHEET #1

9. Adjust the upper and lower form dampening rollers on the Heidelberg GTO with the following procedure (Figure 5):

FIGURE 5



(Courtesy Heidelberg Offset)

a. Adjust the upper form dampening roller to the plate by the adjusting screw (No. 7) only while the press is running. The setting is correct when only a slight "roller bounce" is felt through the screwdriver when the roller passes over the plate cylinder gap.

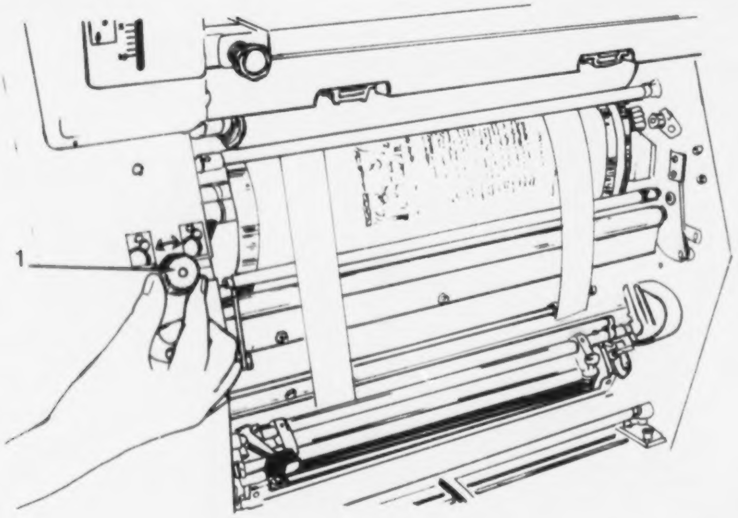
(NOTE: Heidelberg recommends using the long screwdriver delivered with the press as the proper tool for this procedure.)

b. Adjust the lower form dampening roller to the plate by the adjusting screw (No. 8), using the same procedure as with the upper form dampening roller.

JOB SHEET #1

10. Adjust the pressure between the dampening form roller and the plate cylinder on the Itek 3985 with the following procedure (Figure 6):

FIGURE 6



(Courtesy A.B. Dick)

   a. Set operating lever to bring dampening form roller into contact with the plate.

   b. Check pressure with paper strips.

   c. Adjust accordingly with adjustment knobs (1) on both operator and nonoperator sides of press. Turning knobs in counterclockwise direction will increase pressure.

11. Clean work area; return tools and equipment to proper storage.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

JOB SHEET #2—ADJUST INK FORM ROLLERS TO PLATE CYLINDER

Name ______________________________ Attempt Number __________

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Ink form rollers to plate cylinder adjusted properly according to operator's manual	_____

Introduction: This exercise is aimed at familiarizing the student with press adjustments to provide proper roller pressures.

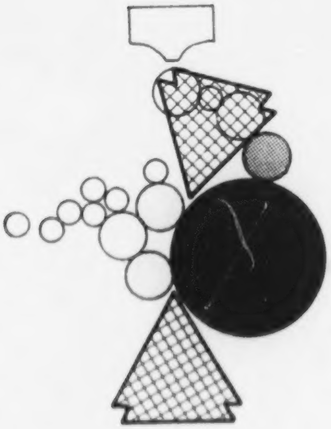
A. Tools and equipment

1. Screwdriver
2. Allen wrench, if required
3. Box end wrench or adjustable wrench
4. Adjustment wrench, if required
5. Operator and/or maintenance manual for selected duplicator

JOB SHEET #2

B. Procedure (Figure 1)

FIGURE 1



(NOTE: A properly adjusted machine is indicated when an ink roller check gives uniform parallel stripes of ink; irregular stripes indicate either uneven settings or worn rollers; depending on the duplicator or duplicators available, your instructor may direct you to complete all or some of the following procedures or use the procedures as guidelines for a selected duplicator; these procedures are adapted from materials published by the 3M Company.)

JOB SHEET #2

1. Adjust the ink form rollers on an ATF Chief 15 or Chief 17 with the following procedures (Figure 2):

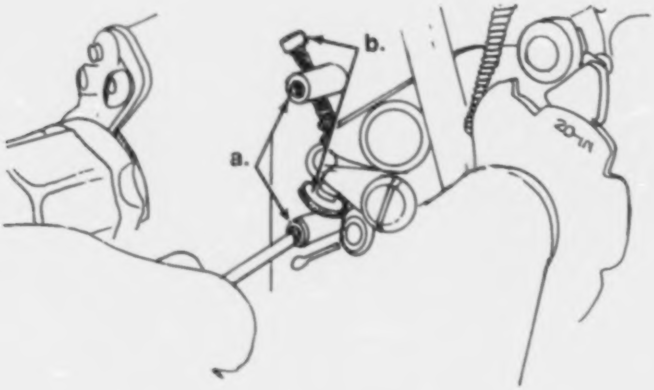
   a. Loosen ink form roller lock screw (a) on the side requiring adjustment.

   b. Turn the ink form roller adjusting screw (b) clockwise to decrease the width of the stripe or counterclockwise to increase the width of the stripe.

   (NOTE: Make adjustment on both operator and nonoperator sides of machine.)

   c. Tighten lockscrew.

FIGURE 2

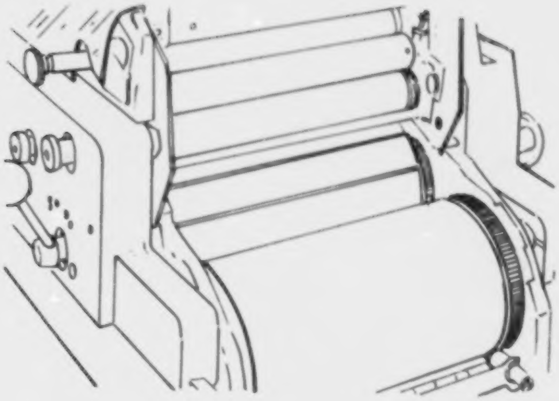


(Courtesy American Type Founders, Inc.)

2. Adjustments to the ink form rollers on Multilith 1250 Offset should only be made by a Multigraphics service representative (Figure 3):

JOB SHEET #2

FIGURE 3



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3. Adjust the ink form rollers on an A.B. Dick 360 with the following procedures (Figure 4):

   a. Loosen lock screws (a) on both sides and adjust screws (b) as necessary.

   b. Upper ink form roller ink stripe should be 1/8" wide.

      1) Turn screw (b) on operator side of machine in clockwise direction to increase width of stripe.

      2) Turn screw (b) on the nonoperator side of the machine in a counterclockwise direction to increase width of stripe.

   c. Lower ink form roller ink stripe should be 5/32" wide.

      1) If lower roller is same size as upper roller, adjust same as steps **b1** and **b2**.

      2) If lower roller is larger than upper roller

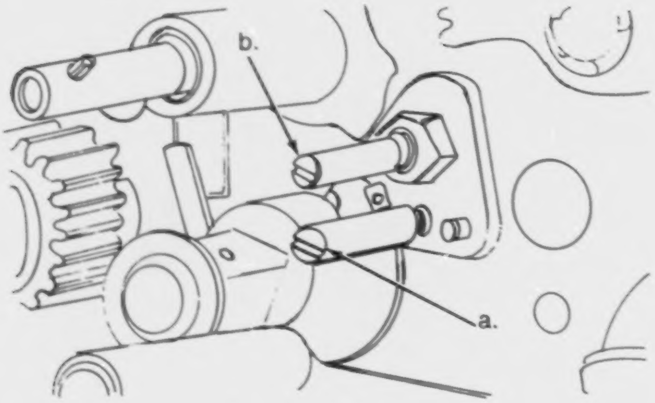
         1) Turn screw (b) counterclockwise on operator side of the machine to increase width of stripe.

         2) Turn screw (b) clockwise on nonoperator side of the machine to increase width of stripe.

JOB SHEET #2

d. Tighten lock screws.

FIGURE 4



(Courtesy A.B. Dick)

4. Adjust the ink form rollers on the Heidelberg GTO with the following procedure:

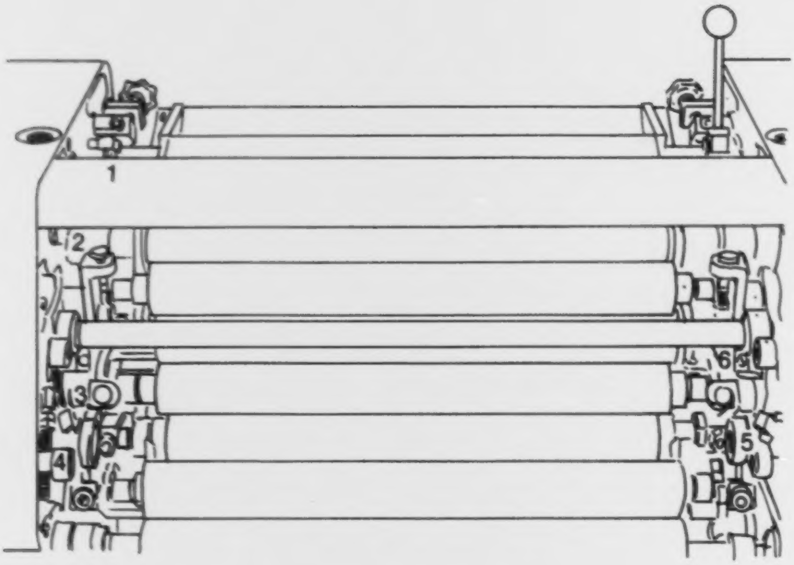
   (NOTE: The adjustment of each ink form roller is combined in one adjusting mechanism at each side of the press.)

   a. Adjust ink form roller Number 1 to the plate on the feeder side of the press with the countersunk screw (5) marked by a white ring (Figure 5).

   b. Adjust ink form roller Number 2 with countersunk adjusting screw (6) on the feeder side of the press (Figure 5).

JOB SHEET #2

FIGURE 5

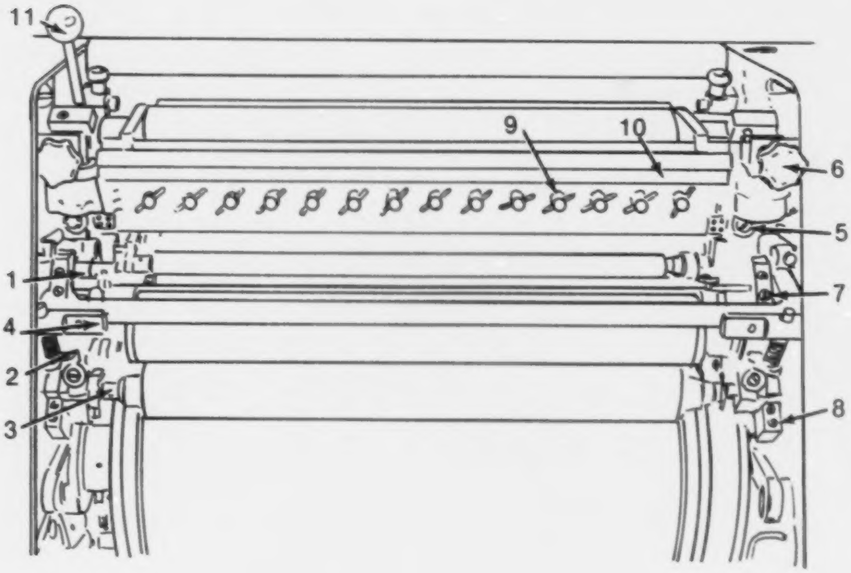


(Courtesy Heidelberg Offset)

c. Adjust ink form rollers Number 3 and Number 4 from the delivery side of the press with adjustment screws (7) and (8) respectively (Figure 6).

JOB SHEET #2

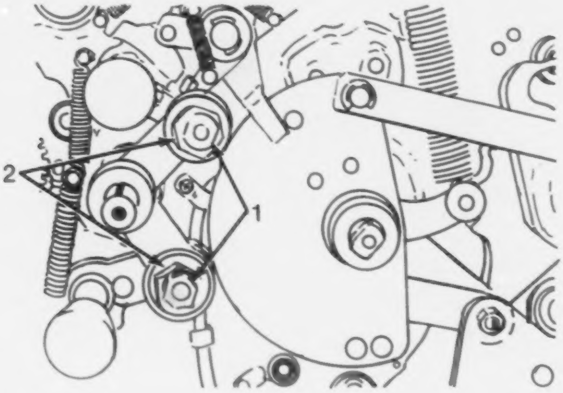
FIGURE 6



(Courtesy Heidelberg Offset)

5. Adjust ink form rollers on the Itek 975 (or Ryobi 3200) with the following procedure (Figures 7 and 8):

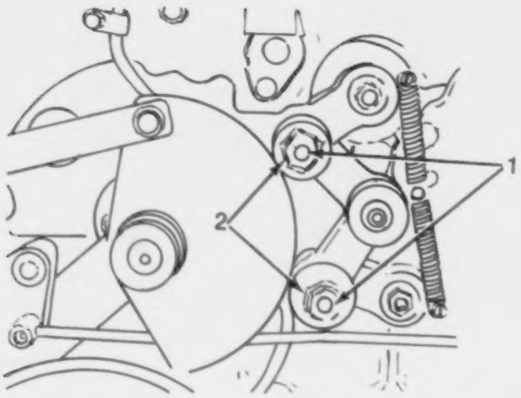
FIGURE 7



(Courtesy A.B. Dick)

JOB SHEET #2

FIGURE 8



(Courtesy A.B. Dick)

a. Using a T-wrench, loosen locknuts (1).

b. Adjust pressure by turning the pressure adjustment nuts (2).

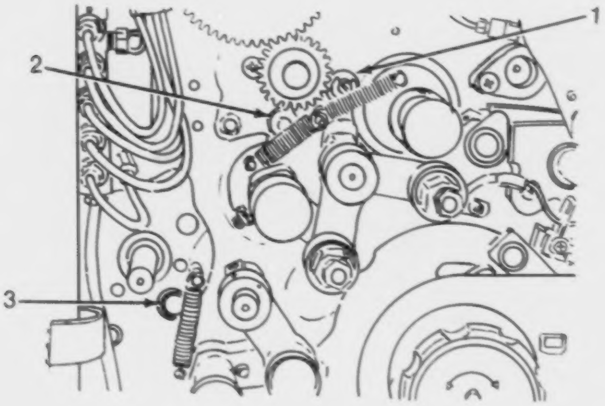
(NOTE: There are two pressure adjustments on both the operator and nonoperator sides of the press.)

c. Turn the pressure adjustment nuts in the direction marked on the nuts to increase the pressure.

JOB SHEET #2

6. Adjust ink form roller pressure on the Itek 3985 with the following procedure (Figure 9):

FIGURE 9



(Courtesy A.B. Dick)

a. Loosen locknuts (1), (2), and (3) and turn the pressure adjustment nuts to increase or decrease pressure.

(NOTE: Pressure adjustments 1, 2, 3 correspond to Number 1, 2, and 3 ink form rollers, and are located on both the operator and nonoperator sides of the press.)

b. Turn the adjustment nut in the direction of the arrow marked on the nut to increase pressure.

7. Clean work area; return tools and equipment to proper storage.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

JOB SHEET #3—ADJUST PLATE CYLINDER TO BLANKET CYLINDER

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Plate cylinder to blanket cylinder adjusted according to operator's manual	_____
• Stripe width of 1/8" obtained	_____

Introduction: This exercise is aimed at familiarizing the student with press adjustments to provide proper roller pressures.

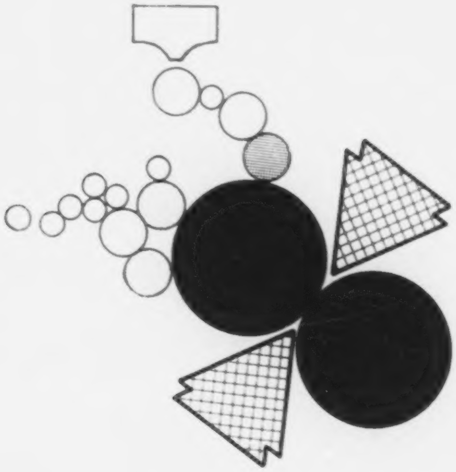
A. Tools and equipment

1. Screwdriver
2. Allen wrench, if required
3. Adjustment wrench, if required
4. Operator and/or maintenance manual for selected duplicator

JOB SHEET #3

B. Procedure (Figure 1)

FIGURE 1



(NOTE: Some of the basic procedures for adjusting plate cylinder to blanket cylinder are common to several duplicators; depending on the duplicator or duplicators available, your instructor may direct you to complete all or some of the following procedures or use the procedures as guidelines for a selected duplicator; these procedures are adapted from materials published by the 3M Company.)

1. Perform ink stripe checks.
2. Complete adjustments as required.
3. Turn the duplicator on and ink up the rest of the plate.
4. Check to make sure the entire plate is covered, not just the image area; this would not give a proper plate-to-blanket check.
5. Do not turn on the dampener rollers.
6. Turn the duplicator off and then gently lower the plate cylinder to the blanket and raise it immediately.
7. Rotate the blanket cylinder by the handwheel and inspect the ink stripe (should be 1/8" wide).

   (NOTE: The ink stripe should be uniform in width; if it is not, refer to operator manual or maintenance manual for cylinder parallel adjustment or ask instructor to assist.)

JOB SHEET #3

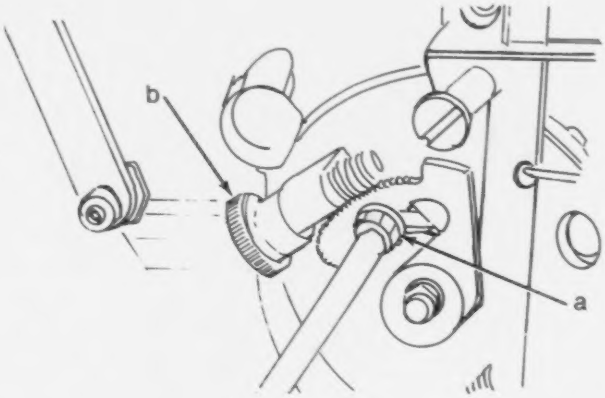
8. Adjust the plate cylinder on an ATF Chief 15 or Chief 17 with the following procedure (Figure 2):

   a. Loosen the locking screw (a).

   b. Turn the plate-to-blanket impression adjusting screw (b) clockwise to increase the width of the stripe or counterclockwise to decrease the width.

   c. Tighten locking screw (a).

FIGURE 2



(Courtesy American Type Founders, Inc.)

JOB SHEET #3

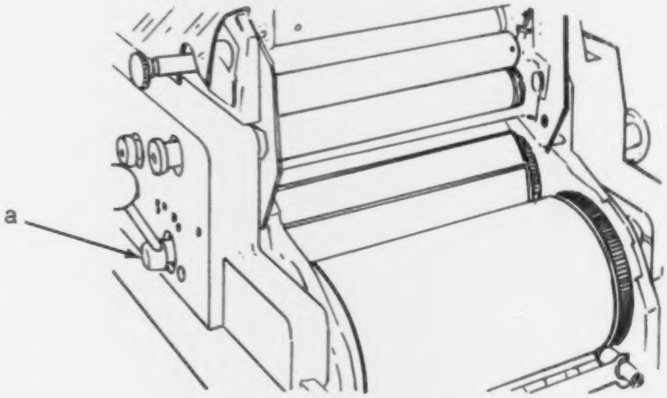
9. Adjust the plate cylinder on a Multilith 1250 Offset with the following procedure (Figure 3):

    a. Loosen lock bolt (a) with a T-wrench.

    b. Move single lever control to left to increase pressure, or to the right to decrease pressure.

    c. Tighten lock bolt (a).

FIGURE 3



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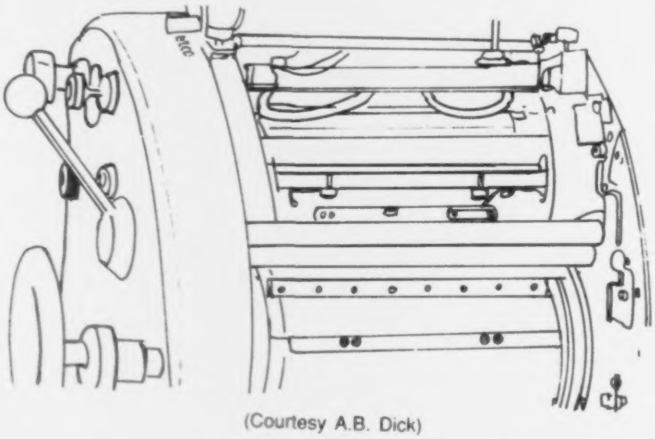
10. Adjust the plate cylinder on an A.B. Dick 360 only under the careful guidance of your instructor or watch the procedure as it is performed by an A.B. Dick service representative (Figure 4):

FIGURE 4



(Courtesy A.B. Dick)

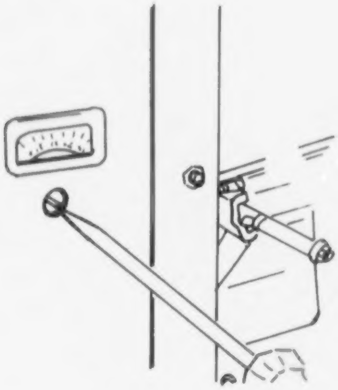
JOB SHEET #3

11. Adjust plate-to-blanket cylinder pressure on Heidelberg GTO by use of paper underlays.

    (NOTE: Plate and blanket cylinders on the Heidelberg GTO run with constant bearer-to-bearer pressure which can be adjusted for differing stock thicknesses by use of paper underlays run beneath the blanket. When a .006-inch offset plate is used with the press' .075-inch offset blanket, a .040-inch underlay blanket and a .002-inch paper underlay, the pressure will be correct for nearly all jobs. If more pressure is required, additional underlays will be required.)

12. Adjust the plate pressure on the Itek 3985 with the following procedure (Figure 5):

    FIGURE 5



(Courtesy A.B. Dick)

    a. Measure plate thickness with a micrometer.

    b. Using manufacturer's specifications and long screwdriver, set plate pressure dial on operator side of press to match the plate thickness.

13. Clean work area; return tools and equipment to proper storage.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

JOB SHEET #4—ADJUST BLANKET CYLINDER TO IMPRESSION CYLINDER

Name ______________________________ Attempt Number __________

Evaluation Criteria	Rating
• Student followed instructions	_____
• Blanket cylinder to impression cylinder properly adjusted according to operator's manual	_____

Introduction: This exercise is aimed at familiarizing the student with press adjustments to provide proper roller pressures.

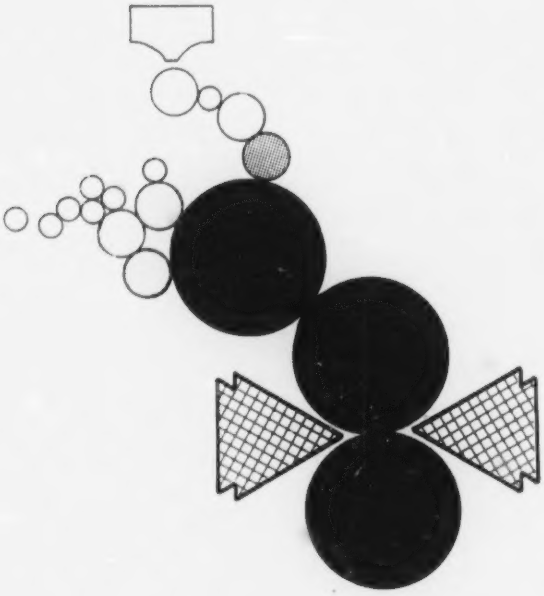
A. Tools and equipment

1. Screwdriver
2. Allen wrench, if required
3. Adjustment wrench, if required
4. Operator and/or maintenance manual for selected duplicator

JOB SHEET #4

B. Procedure (Figure 1)

FIGURE 1



(NOTE: Improper blanket cylinder to impression cylinder pressure may result in damaged blankets and poor quality copy, and running heavier than normal stock also requires blanket cylinder to impression cylinder adjustment; depending on the duplicator or duplicators available, your instructor may direct you to complete some or all of the following procedures or use the procedures as guidelines for a selected duplicator; these procedures are adapted from materials published by the 3M Company.)

JOB SHEET #4

1. Adjust the blanket cylinder on an ATF Chief 15 or Chief 17 with the following procedure (Figure 2):

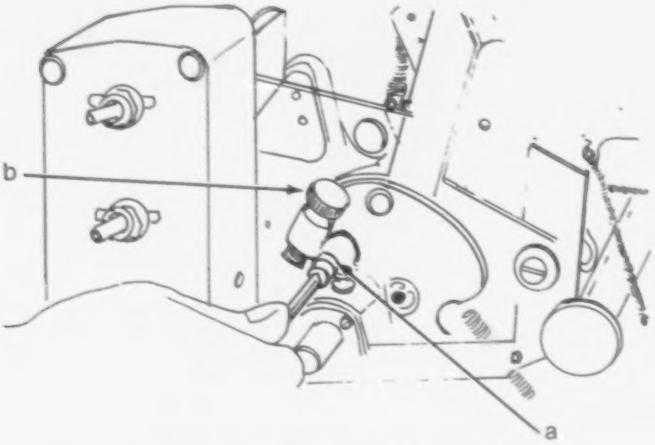
   a. Loosen locking screw (a).

   b. Turn the impression adjusting screw (b) toward you until the print obtained is very light.

   c. Turn the adjusting screw (b) back away from you until the desired impression on the paper is obtained.

   d. Tighten locking screw (a).

   FIGURE 2



(Courtesy American Type Founders, Inc.)

2. Adjust the blanket cylinder on Multilith 1250 Offset with the following procedure (Figure 3):

   a. Slide open cover.

   b. Loosen clamp screw (a) with T-wrench.

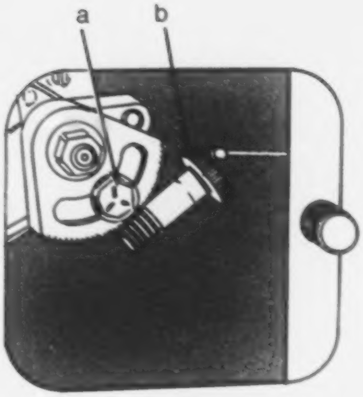
   c. Turn micrometer adjusting screw (b) clockwise to decrease pressure and counterclockwise to increase pressure.

   d. Tighten clamp screw.

   e. Close the cover.

JOB SHEET #4

FIGURE 3



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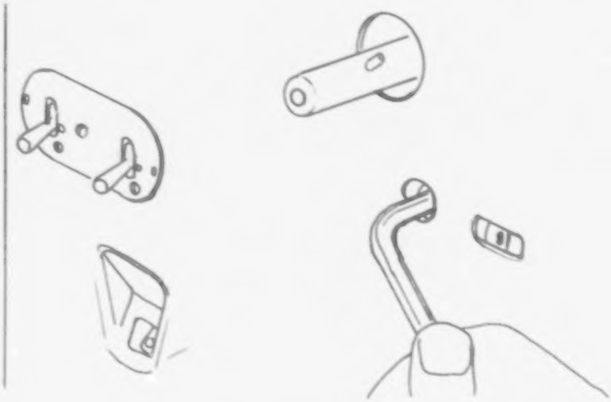
3. Adjust the blanket cylinder on an A.B. Dick 360 with the following procedure (Figure 4):

   a. Insert allen wrench into the control dial opening.

   b. Turn the dial to the lower numbers to increase pressure and to the higher numbers to decrease pressure.

FIGURE 4

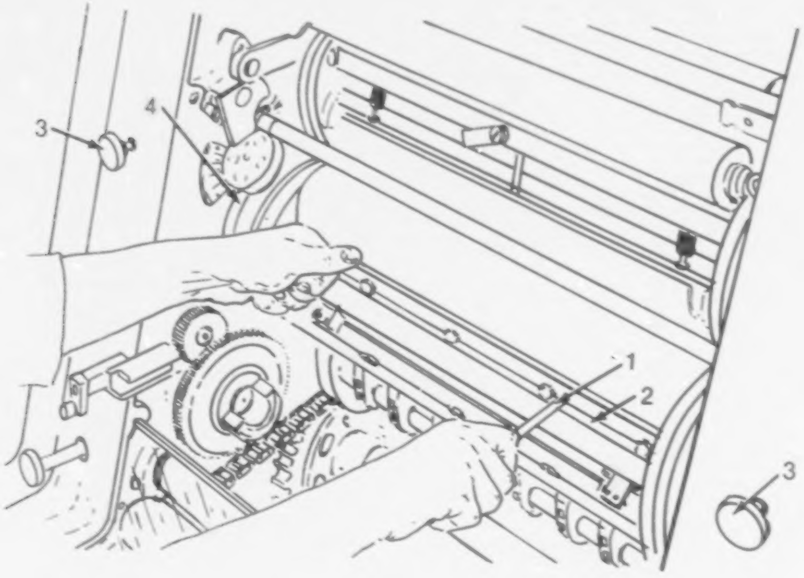


(Courtesy A.B. Dick)

JOB SHEET #4

4. Adjust the pressure between the blanket and impression cylinder on the Heidelberg GTO with the following procedure (Figure 5):

FIGURE 5



(Courtesy Heidelberg Offset)

   a. Adjust by using knurled hand discs (3) on drive and operation side of press.

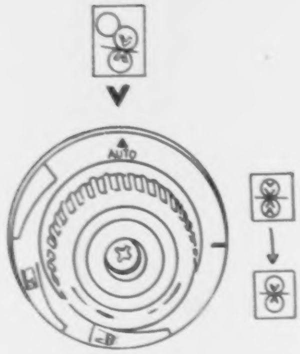
   b. Settings are shown on graduated scales (4).

   c. Using operator's manual and knowledge of paper thickness, set both graduated scales to the proper setting by turning the knurled hand discs (3).

5. Adjust the blanket to impression pressure on the Itek 975 or the Ryobi 3200 with the following procedure (Figure 6):

JOB SHEET #4

FIGURE 6



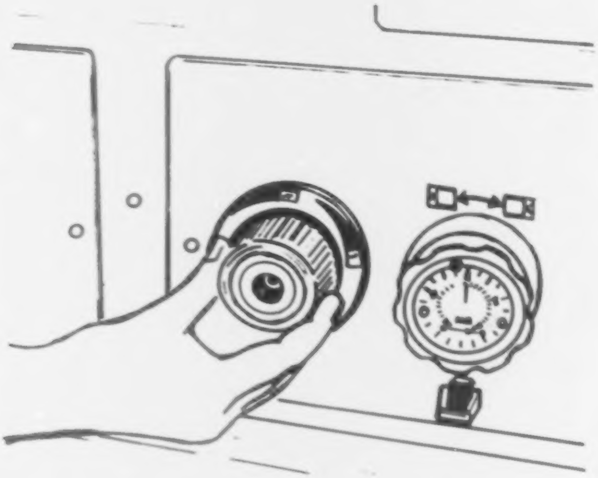
(Courtesy A.B. Dick)

a. Set the automatic pressure device to **AUTO**. The blanket to impression cylinder pressure is controlled by springs.

b. To use fixed impression pressure, set the dial to the paper thickness (in millimeters).

6. Adjust the blanket to impression cylinder pressure on the Itek 3985 with the following procedure (Figure 7):

FIGURE 7



(Courtesy A.B. Dick)

JOB SHEET #4

- a. Measure paper thickness (in millimeters).
- b. Adjust impression pressure adjustment dial on operation side of press to match paper thickness.

7. Clean work area; return tools and equipment to proper storage.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

JOB SHEET #5—CHANGE A MOLLETON COVER

Name ______________________________ Attempt Number __________

Evaluation Criteria	Rating
• Roller removed from press and cover removed without damage to roller	_____
• Roller surface thoroughly cleaned	_____
• New cover placed on roller correctly and roller reinstalled on press	_____

Introduction: This exercise is aimed at familiarizing the student with changing a molleton cover, a process encountered frequently in commercial printing shops.

A. Tools and equipment

1. New molleton cover
2. Installation sleeve
3. Talcum or blanket powder
4. Blanket wash
5. Roller conditioner-cleaner
6. Paper as required

B. Procedure

1. Remove roller from press.
2. Split cover for easy removal from roller.

   (CAUTION: Do not cut roller surface.)

3. Clean surface thoroughly with blanket wash and with water and roller conditioner-cleaner to remove all ink and gum.
4. Complete the change according to one of the following procedures:
   a. If installation sleeve is available:
      1) Slide cover over sleeve.
      2) Insert roller inside sleeve.
      3) Hold end of cover on end of roller as sleeve is removed.

JOB SHEET #5

b. If no installation sleeve is available:

    1) Coat roller with blanket or talcum powder.

    2) Prepare a piece of paper 1½ times the length of the roller and wide enough to wrap around the roller two times.

    3) Coat the paper with blanket or talcum powder.

    4) Wrap the paper loosely around the roller, leaving 1/3 the length of the roller exposed.

    5) Slide the cover over the rolled paper onto the roller until the cover just overlaps the exposed end of the roller.

    6) Grasp the cover and roller on the exposed end and pull the rolled paper from between the cover and roller.

5. Secure cover by pulling draw strings to overlap cover ends over roller ends.

6. Soak new cover with fountain solution.

7. Remove excess moisture from cover by rolling with open palms on top of paper towels on a flat surface.

8. Clean work area; return tools and equipment to proper storage.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

JOB SHEET #6—DEGREASE PLATE AND IMPRESSION CYLINDERS

Name ____________________________ Attempt Number ________

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Cylinder cleaned properly with careful use of chemicals	_____

Introduction: This exercise is aimed at familiarizing the student with cleanup procedures encountered frequently in the commercial world.

A. Tools and equipment

1. Chrome cylinder cleaner
2. Degreaser
3. Clean cotton pads
4. Plate etch

B. Procedure

1. Wipe the entire surface of the cylinder being cleaned with chrome cylinder cleaner or degreaser, using a saturated cotton pad.
2. Apply three coats to the cylinder and rub each coat vigorously.
3. Wash chrome cylinder cleaner or degreaser off, using a clean cotton pad saturated with water.
4. Wipe dry.
5. Wipe the entire surface of the cylinder with a clean cotton pad saturated with etch.
6. Remove excess etch with a clean, dry cotton pad.

   (CAUTION: Cleaners may cause skin irritation; avoid prolonged skin contact and wash hands with soap and a generous quantity of water after using a cleaner.)

7. Clean work area; return tools and equipment to proper storage.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

JOB SHEET #7—DEGLAZE INK ROLLERS AND BLANKET

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Ink rollers and blanket deglazed properly with careful use of chemicals	_____

Introduction: This exercise is aimed at familiarizing the student with cleanup procedures encountered frequently in the commercial world.

A. Tools and equipment

1. Deglazer
2. Blanket powder
3. Roller conditioner-cleaner
4. Water miscible cleaner
5. Household abrasive cleaner
6. Shop towels

B. Procedure

(CAUTION: Deglazer and roller conditioner-cleaner are highly flammable. Keep them away from heat or open flame. These solvents can also cause skin irritation, so after using them wash hands immediately with soap and a generous quantity of water.)

1. Apply deglazer on both surfaces to be cleaned; be sure to use only a deglazer recommended by manufacturer or supplier.
2. Follow deglazer with an ink roller conditioner to clean water soluble particles from rollers and blanket as recommended by manufacturer or supplier.
3. Clean rollers with roller cleaner and blanket wash to remove active ingredients in the deglazer.

JOB SHEET #7

4. Apply blanket powder to the blanket surface, and if an abrasive cleaner is applied, thoroughly rinse the rollers with water until all traces of the cleaner are gone.

   (NOTE: To get maximum life from blankets, it is recommended that they be rotated each week, conditioned with blanket powder, and allowed to rest a week before being put back in service. When repeated cleaning of the blanket is necessary, changing the blanket daily is recommended. Blankets on or off the cylinder should be kept away from heat and sunlight, and when they are stored, it should be in a dark, cool place out of direct sunlight and protected from dirt and damage.)

5. Clean work area; return tools and equipment to proper storage.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

JOB SHEET #8—CHANGE BLANKET

Name ______________________________ Attempt Number __________

Evaluation Criteria	Rating
• Blanket properly cleaned and removed with press power unplugged	_____
• New blanket installed according to operator's manual and rechecked for tightness	_____

Introduction: This exercise is aimed at familiarizing the student with a frequently encountered offset press activity.

A. Tools and equipment

1. Allen wrench or specific tool recommended by manufacturer
2. New or spare blanket
3. Cleaner
4. Deglazer
5. Blanket powder
6. Shop towels
7. Cotton pads

B. Procedure

1. Unplug power supply to the press.
2. Clean blanket thoroughly using a standard deglazing procedure.
3. Remove blanket from cylinder by releasing blanket clamps.
4. Clean blanket cylinder surface and clamps.
5. Remove bars, if blanket is attached to cylinder by bars.
6. Clean bars and attach them to the new blanket.
7. Wipe surface of old blanket dry.
8. Apply a liberal quantity of blanket powder to a cotton pad and gently pat the entire surface of the old blanket, adding additional blanket powder to the cotton pad as required.

JOB SHEET #8

9. Rub the powder gently into the entire blanket surface.

10. Make sure the backing is clean and dry, then roll the old blanket with the rubber side in.

    (NOTE: Placing a sheet of plain, clean paper over the rubber before rolling will further protect the blanket surface.)

11. Place old blanket in its original carton so that when stored it will be in a horizontal position.

12. Attach new blanket to cylinder in reverse order of removal.

13. Adjust new blanket so that tension is applied uniformly across the entire width and length of the blanket.

    (NOTE: Over-tightening will cause the blanket surface to become uneven, and if the blanket is too loose, copy quality will suffer, usually causing a ghost image on finished copy; always follow the manufacturer's recommendations for blanket installation.)

14. After running a few hundred copies, retighten blanket at trailing edge.

15. Clean work area; return tools and equipment to proper storage.

PREVENTIVE MAINTENANCE AND TROUBLESHOOTING
UNIT IV

JOB SHEET #9—BACKFLUSH VACUUM PUMP

Name ______________________ Attempt Number __________

Evaluation Criteria	**Rating**
• Vacuum lines disconnected and pump correctly backflushed according to operator's manual	_____
• Vacuum lines reattached correctly and pump checked for proper operation	_____
• Date of service marked on maintenance record	_____

Introduction: This exercise is aimed at familiarizing the student with a frequently encountered offset press activity.

A. Tools and equipment

1. Adjustable wrench
2. Press operator's manual
3. Container of solvent and oil mixture (provided by instructor)

B. Procedure

(CAUTION: Many presses are currently equipped with carbon-vane pumps which require no backflushing. Be certain your press is not equipped with one of these newer pumps before proceeding with backflushing operation. Backflushing a carbon-vane pump can cause major damage to its internal parts.)

1. Using operator's manual and instructor's guidance, follow steps to disconnect air and vacuum lines from pump.
2. Follow operator's manual instructions to inject flushing mixture into and out of the pump.
3. Reconnect air and vacuum lines.
4. Wipe pump and pump surroundings to clean any spilled solvent/oil mixture.
5. Fill pump oil reservoir according to manufacturer's specifications.
6. With instructor's guidance, run press to test pump and integrity of vacuum lines and connections.
7. Mark date of pump service on maintenance log.
8. Clean work area; return tools and equipment to proper storage.

JOB TICKET AND COST AWARENESS
UNIT V

UNIT OBJECTIVE

After completion of this unit, the student should be able to determine printing job costs, and be familiar with how a job ticket is used to conduct a printing job from start to finish. Competencies will be demonstrated by completing the assignment sheet and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to cost awareness with their correct definitions.
2. List fixed and variable costs of a printing job.
3. List cost items to consider when giving an estimate on a printing job.
4. Select from a list cost awareness factors for a successful printing business.
5. Select proper practices for waste management in the printing shop.
6. State the definition of a job ticket.
7. List the components of a job ticket.
8. Select true statements concerning printing trade customs.
9. Estimate costs of printing jobs. (Assignment Sheet #1)

JOB TICKET AND COST AWARENESS
UNIT V

INFORMATION SHEET

I. **Terms and Definitions**

A. Estimate—A detailed statement of all costs and charges related to a printing job

B. Fixed cost—Any cost that does not change with production volume, such as rent or utilities

C. Gross profit—The amount of revenue left after direct printing costs have been paid

D. Invoice—The bill for the customer's printing job

E. Labor—That part of the cost which is an hourly wage rate paid to employees working on the job

F. Markup—A predetermined percentage added to the job price to recover combined expenses and profit

G. Materials—The consumable items required for the printing job, such as paper, ink, plates, etc.

H. Net profit—The amount of revenue left after all costs, fixed and variable, have been paid

I. Quotation—The actual selling price of the printing job, quoted and recorded

J. Variable cost—Any cost that increases or decreases directly with production volume, such as paper, ink and film

II. **Fixed and variable costs of a printing job**

A. Fixed costs

1. Insurance
2. Advertising
3. Taxes
4. Building rental
5. Utilities
6. Maintenance

INFORMATION SHEET

B. Variable costs

1. Labor
2. Paper
3. Ink
4. Plates
5. Film

III. **Cost items to consider when giving an estimate on a printing job** (See Student Supplement 1.)

A. Composition

B. Line negatives

C. Halftone negatives

D. Plates

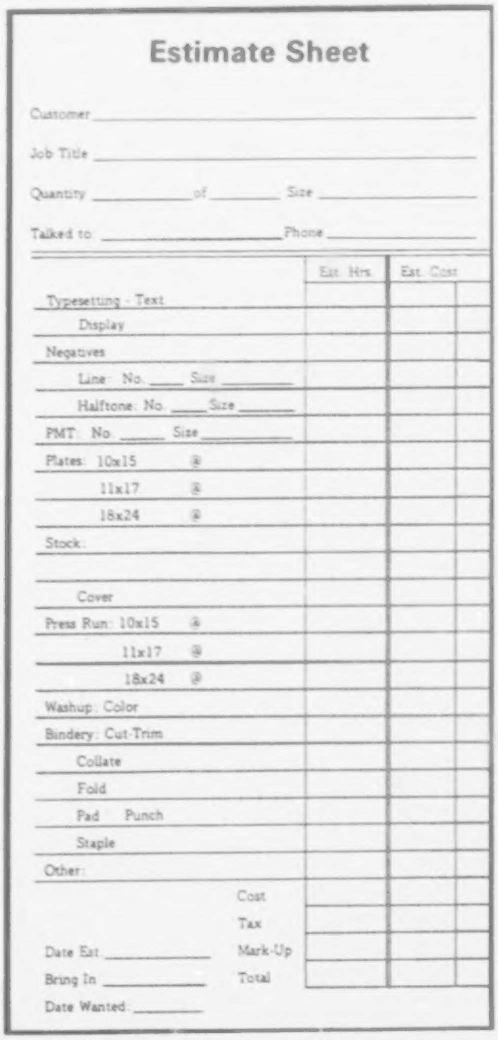
E. Press runs

F. Ink

G. Bindery charges

H. Paper stock

I. Labor



Estimate Sheet

Customer ______________________________

Job Title ______________________________

Quantity __________ of ________ Size ____________

Talked to: __________________ Phone ____________

	Est. Hrs.	Est. Cost	
Typesetting - Text			
Display			
Negatives			
Line: No. ____ Size ________			
Halftone: No. ____ Size ______			
PMT: No. _____ Size __________			
Plates: 10x15 @			
11x17 @			
18x24 @			
Stock:			
Cover			
Press Run: 10x15 @			
11x17 @			
18x24 @			
Washup: Color			
Bindery: Cut-Trim			
Collate			
Fold			
Pad Punch			
Staple			
Other:			
Cost			
Tax			
Mark-Up			
Total			

Date Est. __________

Bring In __________

Date Wanted: ________

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INFORMATION SHEET

IV. Cost awareness factors for a successful printing business

A. Net profit

(NOTE: Net profit is the key to success and survival of a business.)

B. Markup

(NOTE: Markup should be designed to produce the required net profit.)

C. Wages and salaries

D. Cost of equipment (depreciated annually)

E. Sales

F. Production quality

G. Waste management

V. Waste management practices

A. Recycling

1. Save plates and negatives for silver and aluminum reclamation.
2. Save hole punch waste for paper recycling.
3. Pad trim waste for scratch pads or sell for recycling.

B. Shop planning

1. Plan bulk paper cuts carefully to avoid waste.
2. Schedule press runs to take advantage of setup and press wash time.

(NOTE: Common wisdom and experience have taught us waste is expensive, and can quickly eat into net profits. For years, for instance, it could have been said correctly that buying bulk paper and cutting it to fit various jobs—being careful to use as much of the paper as possible without waste—was the most efficient use of paper inputs.

Technology, however, can change even the most basic ground rules. For instance, the increasing popularity of office copy machines has created a tremendous demand for 8½ x 11 copy paper bound in reams. With this demand has come volume production and a corresponding drop in prices because of efficiency of manufacturing large quantities of the paper.

One printer recently gave the example of a customer ordering 8,000 6x9 sheets of scratch paper, for which he had bulk paper that could have been cut with NO waste. The price he had to charge would have been TEN TIMES as much as using 8,000 sheets of 8½x11 copy paper and wasting part of the top and side of each sheet!

This is not an endorsement of waste, but it is an example of why the astute printer must be aware of all costs and alternatives. The market place continues to change and so do the people who stay in business! Know your costs and use that knowledge to your benefit.)

INFORMATION SHEET

VI. **Job ticket**—The formal, written specification sheet which serves as a blueprint for the printing job and follows a job from order taking to delivery

(NOTE: A good job ticket should carry all the information necessary for the various stations of the shop to complete their work and move the job from pre-press stages through the bindery and on to the customer delivery. In many shops, a job ticket consists of a manila envelope to contain raw and set type, photos, halftones, negatives, samples of the job from previous printing and any other instructions or materials needed to complete the job.)

VII. **Components of a job ticket** (See Student Supplement 2.)

A. Customer's name

B. Customer's address

C. Customer's telephone number

D. Customer representative (or individual to be shown proof)

E. Date promised

F. Sample of job (if previously printed)

  1. Record of date of previous printing
  2. Quantity printed
  3. Price quotations for various quantities
  4. Stock used
     a. Who cut
     b. How many sheets used

G. Current price quotation

H. Stock to be used

I. Ink to be used

J. Finishing and binding requirements

  1. Binding
  2. Collating
  3. Drilling

4. Padding

5. Stitching

6. Wrapping

K. Time spent at each station

(NOTE: Many shops require that each production station from pre-press through the bindery make notations of time charged to each job. Some shops base charges solely on total time spent, some use such notations to compare to a standardized price list such as Franklin Offset Price List, and some smaller shops do not use time charges at all, but charge according to knowledge of labor, fixed costs and materials.)

L. Layout sheet or dummy for multi-page jobs

M. Typesetting specifications (if any)

N. Photo and darkroom instructions

a. Page placement

b. Proportional sizing for art or copy blocks

O. Press requirements

a. Ink colors

b. Scoring or perforation

P. Delivery instructions

(NOTE: At the completion of a job, the job ticket may instruct bindery personnel to separate and attach 10 to 12 samples of the job to file for future reference.)

VIII. Printing trade customs

A. Orders—Regular orders cannot be cancelled unless an agreement to cover the printer's loss has been made.

B. Experimental work—Experimental work will carry a charge.

EXAMPLES: Sketches, drawings, composition, plates

C. Sketches, dummies, negatives, and plates—Remain exclusive property of printer unless otherwise agreed to in writing.

D. Alterations—Changes made by the customer will carry an additional charge.

E. Approval of proofs—Printer is not responsible for errors if work is completed with customer's approval.

INFORMATION SHEET

F. Press proofs—An extra charge will be made if a delay on the press results from awaiting customer's approval of press proofs.

G. Color proofing—Because of differences in equipment and conditions, a reasonable variation in color between color proof and the completed job shall constitute an acceptable delivery.

H. Quantities—Overruns or underruns of up to 10% shall constitute an acceptable delivery; excess or deficiency shall be charged or credited to the customer.

I. Customer's property—Customer shall be charged for handling and storing personal paper stock or printed matter held over thirty days; all property is stored at customer's risk.

J. Delivery—Unless otherwise specified, price is quoted on a single shipment, F.O.B. customer's local place of business; estimates are based on continuous and uninterrupted delivery of completed order.

K. Terms—Net cash within thirty days unless otherwise specified; claims must be made within five days of receipt of goods.

L. Delays in delivery—All agreements are contingent upon fires, strikes, accidents, wars, floods, or other causes beyond printer's control.

M. Paper stock furnished by customer—All paper stock shall be properly packaged, free of dirt, tears, and be of proper specifications; if not, delays in production shall be charged to the customer.

(NOTE: The above customs are examples of what one may observe in the printing trade; different printers may add to or amend these customs.)

JOB TICKET AND COST AWARENESS
UNIT V

STUDENT SUPPLEMENT 1—SAMPLE MATERIAL COST SHEET

Film Prices	
9 x 12 or Less	$1.50
Larger than 9 x 12	$3.00
12 x 18	$3.50

Plate Prices	
10 x 15 'E'	$1.50
10 x 15 'M'	$2.00
11 x 18 'M'	$2.50
11 x 18½'M'	$2.50

Contact Prints	
Less than 10 x 12	$1.00
10 x 12	$1.50

Composition	(Simple)	(Complex)
5½ x 8½	$5.25	$7.00
8½ x 11	9.50	14.50
Business Cards	4.00	5.00
Letterheads	5.25	7.50
Envelopes	4.00	5.25
Ruled Forms (5½ x 8½)	12.00	15.00
Rules Forms (8½ x 11)	15.00	20.00

Reprints (Plate on File)
$3.50 + Stock + 30%
Stock Furnished
Add all charges + 30%,
then subtract stock cost.
Colors
Add $3.50 for second color.
Add $9.00 for additional colors.

Collating
$ .65 per Hundred Sheets
$ .35 per Hundred Sheets (Over 1M)
Folding
$ .15 per Hundred Sheets
Stitching
$ .03 per Book or Set
Padding
$ .15 per Pad

Pictures	
Halftones 5 x 7 or Less	$4.00
Halftones Larger than 5 x 7	$5.00

* Outside printing is priced at material cost plus 30%.

* Charge for posters and handbills on the basis of simple composition.

PAPER PRICES

Bond	8½ x 11	8½ x 14
20 Lb. White	$1.20 per Hundred	$1.40 per Hundred
20 Lb. Colors	1.50 per Hundred	1.70 per Hundred
(2 Reams or More)	4.80 per Ream	5.20 per Ream

Index	8½ x 11
110 Lb. White	$1.70 per Hundred
110 Lb. Colors	1.80 per Hundred

Carbonless	8½ x 11	8½ x 14
2-Part	$24.00 (500 Sets)	$28.00 (500 Sets)
3-Part	42.00 (500 Sets)	49.00 (500 Sets)
4-part	60.00 (500 Sets)	68.00 (500 Sets)

Scott Offset	8½ x 11	11 x 17
70 Lb. White	$1.40 per Hundred	$1.80 per Hundred
70 Lb. Colors	1.70 per Hundred	2.10 per Hundred
60 Lb. White	1.30 per Hundred	1.60 per Hundred
60 Lb. Colors	1.70 per Hundred	1.90 per Hundred

STUDENT SUPPLEMENT 2—SAMPLE JOB TICKET

Sample Job Ticket (Top)

DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION

GRAPHICS DIVISION

Approved by ____________

FY		Date Received		Date Due		Date Comp.
Artist	Planner	Quote	Other	Previous Order #	TYPE REQUIRED BY	CAMERA READY ART TO PREP BY
DIVISION	ORDERED BY			PHONE	BLUELINES TO DIVISION BY	PLATES FOR PRESS BY
DESCRIPTION					READY FOR BINDERY BY	DELIVER TO DIVISION TO
DELIVER TO (if different from above)				Invoice To		
Special Inst.						

QUANTITY	TRIM SIZE	GRAIN DIR	DESCRIPTION	BINDING EDGE

PAPER STOCK

BUY OUT	SHEET SIZE	GRAIN DIR	KIND OF PAPER	NO SHEETS	CUTTING INSTRUCTIONS			Deliver	SPECIAL CUTTING INSTRUCTIONS
					Cut to	Pcs. Out	Total		

OUTSIDE PURCHASES

ORDERED FROM	COST	DATE REQUIRED

SPECIAL INSTRUCTIONS

COMPOSITION

Proofreading	☐ By Printer	☐ By Division
Corrections	☐ Printer Proofreads	☐ Division
Bluelines	☐ Loose	☐ Bound
Color Key	☐ No Proof	

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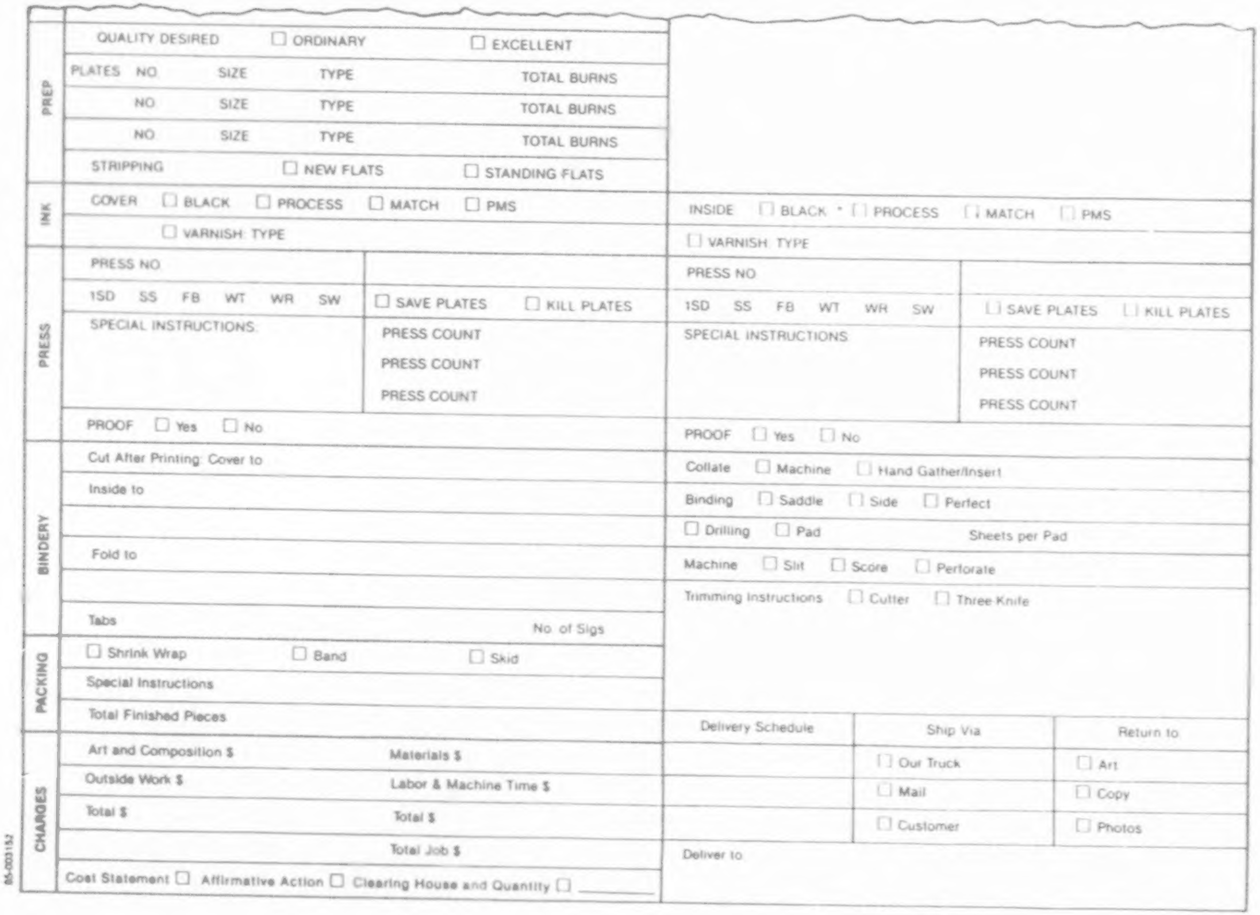
Sample Job Ticket (Bottom)



PREP

QUALITY DESIRED ☐ ORDINARY ☐ EXCELLENT

PLATES NO. SIZE TYPE TOTAL BURNS

NO. SIZE TYPE TOTAL BURNS

NO. SIZE TYPE TOTAL BURNS

STRIPPING ☐ NEW FLATS ☐ STANDING FLATS

INK

COVER ☐ BLACK ☐ PROCESS ☐ MATCH ☐ PMS

☐ VARNISH: TYPE

PRESS

PRESS NO.

1SD SS FB WT WR SW ☐ SAVE PLATES ☐ KILL PLATES

SPECIAL INSTRUCTIONS:

PRESS COUNT

PRESS COUNT

PRESS COUNT

PROOF ☐ Yes ☐ No

BINDERY

Cut After Printing: Cover to

Inside to

Fold to

Tabs No. of Sigs

PACKING

☐ Shrink Wrap ☐ Band ☐ Skid

Special Instructions

Total Finished Pieces

CHARGES

Art and Composition $ Materials $

Outside Work $ Labor & Machine Time $

Total $ Total $

Total Job $

Cost Statement ☐ Affirmative Action ☐ Clearing House and Quantity ☐ ______

85-003152

INSIDE ☐ BLACK · ☐ PROCESS ☐ MATCH ☐ PMS

☐ VARNISH: TYPE

PRESS NO.

1SD SS FB WT WR SW ☐ SAVE PLATES ☐ KILL PLATES

SPECIAL INSTRUCTIONS

PRESS COUNT

PRESS COUNT

PRESS COUNT

PROOF ☐ Yes ☐ No

Collate ☐ Machine ☐ Hand Gather/Insert

Binding ☐ Saddle ☐ Side ☐ Perfect

☐ Drilling ☐ Pad Sheets per Pad

Machine ☐ Slit ☐ Score ☐ Perforate

Trimming Instructions ☐ Cutter ☐ Three Knife

Delivery Schedule	Ship Via	Return to
	☐ Our Truck	☐ Art
	☐ Mail	☐ Copy
	☐ Customer	☐ Photos

Deliver to

JOB TICKET AND COST AWARENESS
UNIT V

ASSIGNMENT SHEET #1—ESTIMATE COSTS OF PRINTING JOBS

Name ______________________________ Overall rating ____________

Evaluation Criteria	**Rating**
• Directions were followed	______
• Prices accurately calculated	______

Directions: Using the Franklin Offset Catalog provided by the instructor or the material costs in Student Supplement 1, calculate the shop prices of the jobs below.

1. Calculate the total charge of 2,000 simple letterheads, 8 ½ x 11, white 60 lb. Scott offset, one color ink.

Answer $ ______________________________

2. Calculate the total charge of 5,000 handbills (circulars), 6 x 9, medium quality, black ink on white 60 lb. Offset.

CALCULATING PAPER CUTTING
UNIT VI

UNIT OBJECTIVE

After completion of this unit, the student should be able to calculate the most efficient method of cutting paper for a given job and accomplish the cutting in a safe manner. Competencies will be demonstrated by completing the assignment sheets, job sheet, and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to calculating paper cutting with their correct definitions.
2. Select true statements concerning safety rules for operating a paper cutter.
3. State the purpose of jogging paper before cutting.
4. List the two types of paper cutters.
5. Describe two techniques for cutting carbonless paper.
6. State the formula for cutting paper stock.
7. State the formula for determining the number of sheets to be cut for a printing job.
8. State the formulas for making a combination cut.
9. Use the formula for cutting paper stock. (Assignment Sheet #1)
10. Use the formula to determine how many sheets will be required. (Assignment Sheet #2)
11. Calculate a combination cut using stock cutting formula. (Assignment Sheet #3)
12. Draw a cutting diagram. (Assignment Sheet #4)
13. Cut carbonless paper. (Job Sheet #1)

CALCULATING PAPER CUTTING
UNIT VI

INFORMATION SHEET

I. **Terms and definitions**

A. Carbonless paper—Paper coated or impregnated with chemicals to yield an image when pressure is applied

B. Combination cut—Second cut, made in stock cutting, when grain direction is not a factor, and additional pieces can be cut from the waste of the first cut

C. Cutting diagram—Proportional drawing which maps the most cost-efficient method of cutting sheets for a given job

D. Jogging—Handling of sheets to make a neat, evenly piled stack (done by hand or mechanically with a vibrating jogging table)

E. Jogging boards—Wooden tools or blocks used to move or adjust lifts of paper on paper cutter so as to avoid accidentally placing hands or fingers in the way of the cutting blade

F. Lift—Stack of paper being cut or handled

G. Mechanical jogging table—Device used to vibrate sheets into neat lifts

(Courtesy of The Challenge Machinery Co.)

INFORMATION SHEET

H. Piece—Job-size portion cut from the full-size sheet

I. Spoilage allowance—Percentage of extra sheets added to the total job for replacing soiled, damaged or misprinted sheets and for samples to run when setting up the press

J. Trim cut—Cut that allows for actual outside dimensions of a piece of printed matter to be cut after printing is completed

II. Safety rules for operating a paper cutter

A. Check the safety bolt and brake action on powered cutters before each work session.

B. Never disable two-hand controls.

C. Never reach under the knife to remove scrap or straighten a lift—use jogging boards.

D. Never attempt to catch a falling stack of cut stock during the cutting cycle—use a backup board.

E. Keep the cutter and surrounding floor area free of tools, paper, and shop towels.

F. Avoid distractions while operating the cutter.

G. Helpers and other shop personnel must stand clear of the cutter during cutting cycles.

H. All knives and cutting sticks are to be changed according to machine's operating manual.

I. Keep all spare knives bolted to mounting boards.

J. Always turn off power to cutter before leaving the machine unattended.

III. Purpose of jogging paper before cutting—To ensure that all sheets of paper are cut the same size

INFORMATION SHEET

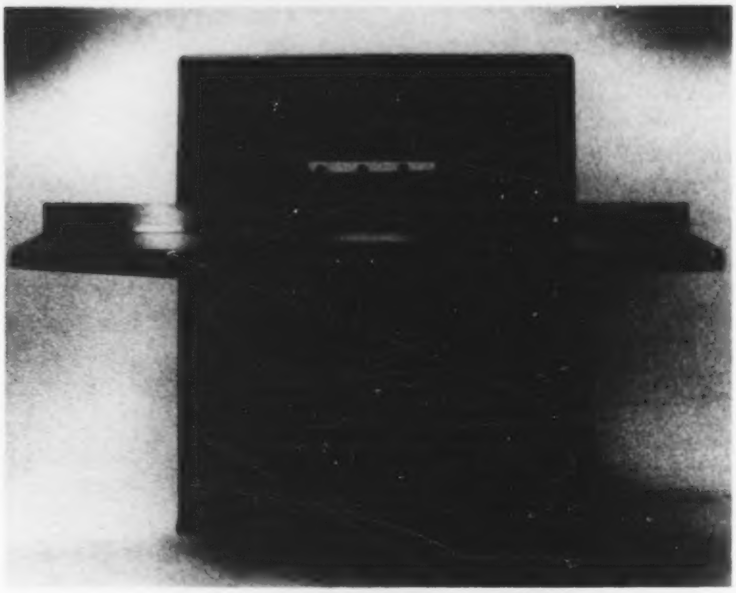
IV. Types of paper cutters

A. Hand-lever paper cutter

(NOTE: Hand-lever paper cutters are becoming obsolete.)

B. Electric or electro-hydraulic power cutter

(NOTE: Modern paper cutters feature hydraulic clamping and cutting with computerized memory systems.)



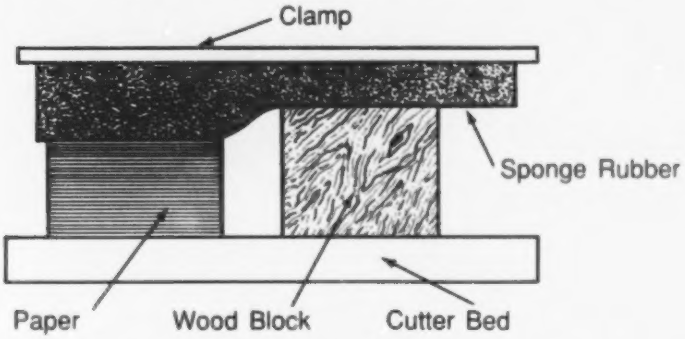
(Courtesy of The Challenge Machinery Co.)

INFORMATION SHEET

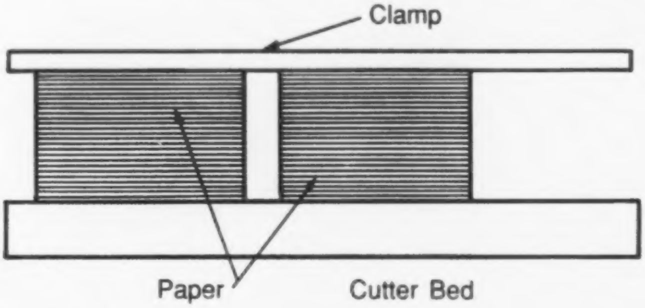
V. Techniques for cutting carbonless paper

(NOTE: Because carbonless paper is coated or impregnated with chemicals to allow imaging when sharp pressure is applied, careful handling during the printing, binding and finishing processes must be ensured. A paper cutter's clamp exerts enough force to spoil carbonless paper unless techniques are used to prevent imaging.)

A. Use a wood block and sponge buffer.



B. Cut two or more lifts at one time.



VI. Formula for cutting paper stock—

$$\frac{\text{Dimensions of Sheet}}{\text{Dimensions of Piece to be Cut}} = \text{Number of Pieces Cut from Sheet}$$

EXAMPLE: How many 8½ x 11 pieces can be cut from a 17 x 22 sheet?

a. $\frac{17 \times 22}{8\frac{1}{2} \times 11}$ Dimensions of Sheet / Dimensions of Piece

b. Divide vertically 8½ into 17 = 2

c. Divide 11 into 22 = 2

d. Multiply the two answers from steps b and c

Answer: 2 x 2 = 4

INFORMATION SHEET

VII. Formula for determining number of sheets to be cut for a printing job—

$$\frac{\text{Desired Number of Pieces}}{\text{Number of Pieces Obtained from One Sheet}} = \text{Total Number of Sheets Needed}$$

EXAMPLE: How many 17 x 22 sheets will be needed to cut 1,000 pieces 8½ x 11?

a. $\frac{1000}{4}$ $\frac{\text{Desired Number of Pieces}}{\text{Number of Pieces Cut from One Sheet}}$

b. Divide 4 into 1,000 = 250

Answer: 250 sheets will need to be cut to produce 1,000 pieces.

(NOTE: An extra sheet must be cut any time there is a remainder when dividing number of pieces into number of sheets.)

VIII. Formulas for making a combination cut—

(NOTE: A combination cut is made when additional pieces can be cut from the waste of the first cut, and when grain direction is not a factor.)

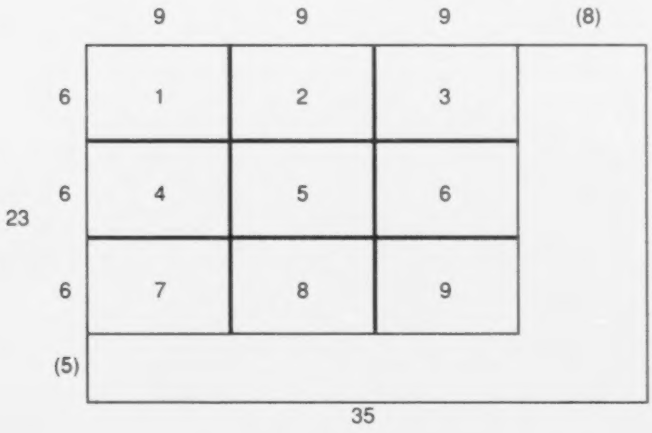
A. $$\frac{\text{Dimension of Sheet}}{\text{Dimensions of Piece to be Cut}} = \text{Number of Pieces Cut from Sheet}$$

B. After measuring waste, calculate

$$\frac{\text{Waste Portion}}{\text{Dimension of Piece to be Cut}} = \text{Number of Pieces Obtained}$$

EXAMPLE: How many 6 x 9 pieces can be cut from one 23 x 35 sheet?

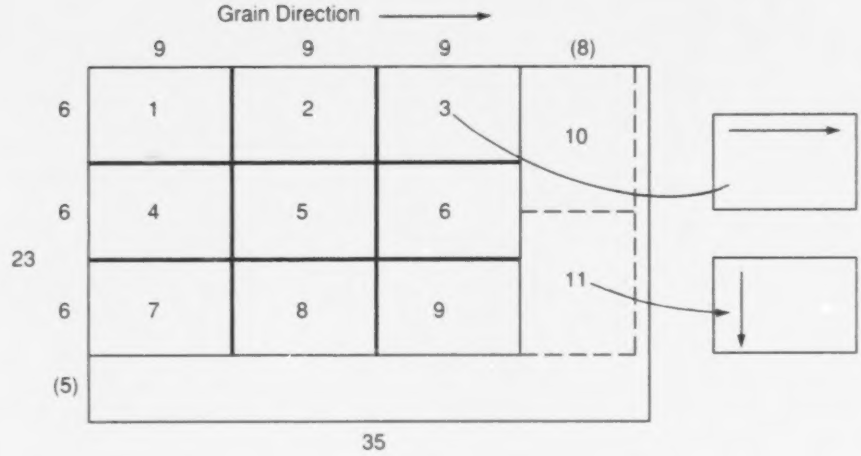
Cut a. $\frac{23 \times 35}{6 \times 9} = 3 \times 3 = 9$



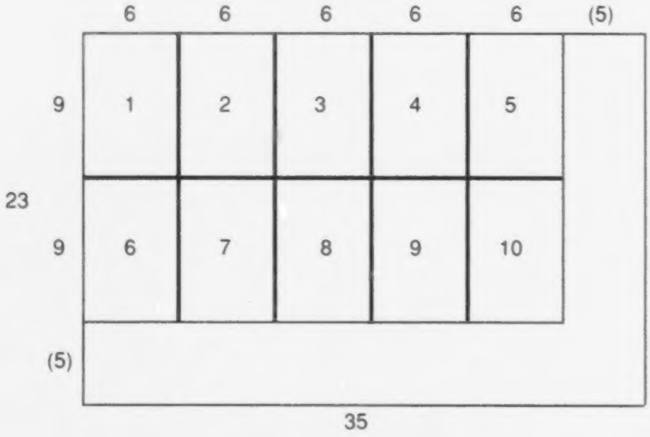
INFORMATION SHEET

$$\frac{8 \times 23}{6 \times 9} = 1 \times 2 = 2$$

9 + 2 = 11 Pieces from Two Cuts



Cut b. $\frac{23 \times 35}{9 \times 6} = 2 \times 5 = 10$ Pieces



(NOTE: One of the waste portions in cut **a** is large enough to accommodate one of the dimensions of the piece size, 6 x 9. Thus, dividing 6 x 9 into the waste portion, 8 x 23, we find that two more pieces can be obtained for a total of 11 pieces. If grain direction were a factor, cut **b** producing 10 pieces would have been the best cut.)

CALCULATING PAPER CUTTING
UNIT VI

ASSIGNMENT SHEET #1—USE THE FORMULA FOR CUTTING PAPER STOCK

Name ______________________________ Overall rating ____________

Evaluation Criteria	**Rating**
• Directions were followed	______
• Math work was shown	______
• Answers provided along with accurate diagram	______

Directions: Using the formula for cutting paper stock, determine how many 6 x 9 pieces can be cut from a 25 x 38 sheet. Show two answers and draw the cutting diagram for the best of the two.

a. ______________________________

b. ______________________________

c. Diagram of best:

ASSIGNMENT SHEET #1

2. Using the formula when sheet size has fractions, determine how many 4 x 6 pieces can be cut from a 22½ x 28½ sheet and show cutting diagram.

   (NOTE: When fractions are part of only the sheet size, this fraction simply becomes part of the waste, and need not be calculated.)

   a. Number of pieces = ____________________

   b. Diagram:

3. Using the formula when piece size has fractions, find the largest number of 2½ x 5½ pieces that can be cut from a 23 x 25 sheet.

   (NOTE: When piece size has fractions, convert to decimals and calculate.)

   Number of pieces = ____________________

CALCULATING PAPER CUTTING
UNIT VI

ASSIGNMENT SHEET #2—USE THE FORMULA TO DETERMINE HOW MANY SHEETS WILL BE REQUIRED

Name ______________________________ Overall rating ____________

Evaluation Criteria	**Rating**
• Directions were followed	______
• Math work was shown	______
• Answers were correct	______

Directions: Using the formula determine how many sheets will be required in the following:

1. First determine how many 3 ½ x 5 ½ pieces can be cut from a sheet 22 x 28.

   Answer: ________________

2. Now determine how many sheets will need to be cut to produce 1000 pieces.

   Answer: ________________

CALCULATING PAPER CUTTING
UNIT VI

ASSIGNMENT SHEET #3—CALCULATE COMBINATION CUT USING STOCK CUTTING FORMULA

Name ____ Overall rating ______________

Evaluation Criteria	**Rating**
• Directions were followed	______
• Diagrams drawn correctly	______

Directions: Find out how many 4 x 6 pieces can be cut from a 23 x 35 sheet. Draw cutting diagrams for both cuts and determine how many additional pieces can be cut from waste of first cut, assuming grain direction is not a factor.

1. Number of pieces = _______________

2. Cutting diagrams:

   a.

   b.

3. Additional number of pieces = _______________

CALCULATING PAPER CUTTING
UNIT VI

ASSIGNMENT SHEET #4—DRAW A CUTTING DIAGRAM

Name ____ Overall rating ______________

Evaluation Criteria	**Rating**
• Directions were followed	______
• Diagrams properly drawn	______
• Answer correctly entered on diagram	______

Directions: Using a sheet of 20 ½ x 24 ¾ index stock, a T-square, a ruler or pica line gauge, and a No. 2 pencil, draw a cutting diagram.

1. Determine how many 4 x 6 pieces can be cut from the 20 ½ x 24 ¾ sheet.

   Answer: ________________

2. Draw the exact cutting diagram on the 20 ½ x 24 ¾ sheet, showing where each cut will be made.

3. Number the pieces to be obtained on the diagram.

CALCULATING PAPER CUTTING
UNIT VI

JOB SHEET #1—CUT CARBONLESS PAPER

Name ______________________________ Attempt Number __________

Evaluation Criteria	**Rating**
• Accurate, clean cut achieved	_____
• No imaging present on cut paper	_____

Introduction: This exercise is aimed at familiarizing the student with the frequently encountered assignment of cutting carbonless paper.

A. Tools and materials

  1. Supply of carbonless paper sheets (provided by instructor)
  2. Paper cutter
  3. Wood block
  4. Sponge rubber buffer

B. Procedure

  1. Jog paper.
  2. Using jogging boards, position carbonless paper against back guide of paper cutter and left side housing.
  3. Place wooden block adjacent to lift and cover both with sponge rubber buffer.

     (NOTE: Take care to keep buffer out of the knife's path.)
  4. Adjust clamp to hold lift firmly beneath sponge rubber buffer.
  5. Turn cutter power "ON".
  6. Following safety rules, make the cut.
  7. Remove lift, block and sponge rubber buffer from cutter.
  8. Turn cutter power "OFF".
  9. Examine cut lift with instructor and discuss results.
  10. Clean cutter area of waste paper made in cut.
  11. Return tools and materials to proper storage.

BINDING AND FINISHING
UNIT VII

UNIT OBJECTIVE

After completion of this unit, the student should know the basic binding and finishing techniques and be able to accomplish basic binding and finishing tasks such as folding, padding, drilling, and stitching jobs in the shop. Competencies will be demonstrated by completing the job sheets and the unit test with a minimum score of 85 percent.

SPECIFIC OBJECTIVES

After completion of this unit, the student should be able to:

1. Match terms related to binding and finishing with their correct definitions.
2. Select true statements concerning binding techniques.
3. List major folding styles.
4. List processes associated with finishing activities.
5. Pad 20-pound stock. (Job Sheet #1)
6. Pad carbonless paper. (Job Sheet #2)
7. Drill paper stock for a 3-ring binder. (Job Sheet #3)
8. Fold paper using a folding machine. (Job Sheet #4)
9. Hand fold, collate, and staple a booklet. (Job Sheet #5)
10. Score a job. (Job Sheet #6)

BINDING AND FINISHING
UNIT VII

INFORMATION SHEET

I. **Terms and definitions**

   A. Binding—Securing pages together by means of wire, thread, adhesive, plastic, etc.

   B. Collating—Gathering, arranging in order and checking several sheets to make a book

   C. Finishing—Final bindery work, such as die cutting, embossing, flocking, foil stamping, laminating or varnishing

   D. Inserting—Placing one signature, sheet, or folded sheet inside another

   E. Jogging—Vibrating paper by machine or by hand to make sure all sheets line up evenly at the edges

   F. Marrying sets—Joining collated sets when number of pages exceeds collator capacity

   G. Padding—Binding a booklet or multi-page job using an adhesive padding compound

   H. Perforating—Partially cutting a sheet in a broken line so it can easily be torn away

   EXAMPLES: Ticket stubs; postage stamps

   I. Scoring—Creasing a sheet mechanically or manually to enable it to fold easily

   J. Stitching—Binding pages of a book together using wire stitches or staples

   K. Tipping—Applying a small amount of adhesive to the edge of a sheet so it can be attached to another

   L. Trimming—Cutting the edges of a bound book to make them even

   (NOTE: This is the last major operation in book binding.)

II. **Binding techniques**

   A. Adhesive binding

      1. Used when less durable, inexpensive binding is preferred, such as in paperback book assembly

      2. In simplest form called padding

INFORMATION SHEET

B. Edition binding

  1. Consists of several signatures sewn together with thread, reinforced with glue and mounted between end sheets and hard covers

  2. Used when books are expected to undergo hard use and need extra protection and strength

  3. Top quality books are given extra support by adding a muslin backing cloth over the glue

C. Looseleaf binding—Gathering and punching for placement in a reusable binder

EXAMPLE: 3-ring binder

D. Perfect binding—Consists of sawing signatures at the folded edge, applying flexible glue to the rough back edge and attaching cover while glue is wet

(NOTE: Some high-quality periodicals such as *National Geographic* use this method of binding without staples.)

E. Plastic binding—Sheets are punched with rectangular slots and held in place by a plastic "comb"

EXAMPLES: Technical manuals and other publications which open flat and allow easy removal of binder to add or change pages

F. Stitching

  1. Side stitching—Placing wire staples or stitches through sides of sheet to bind into book form

  2. Saddle stitching—Placing wire staples or stitches through the folded, gathered sheets to bind into book form

  (NOTE: Many inexpensive pamphlets, brochures, club cook books and school directories use side stitching, while saddle stitching is a popular binding technique found on many magazines.)

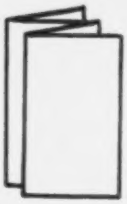
INFORMATION SHEET

Stitching Machine

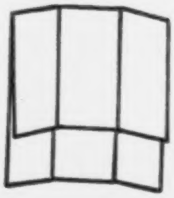
(Courtesy of The Challenge Machinery Company)

III. Major paper folding styles

A. Accordion fold

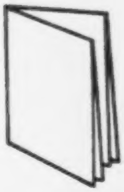


B. Broadside fold

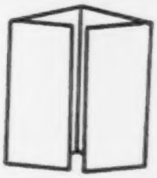


INFORMATION SHEET

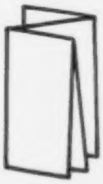
C. French fold



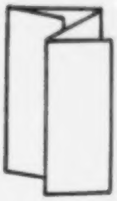
D. Gate fold



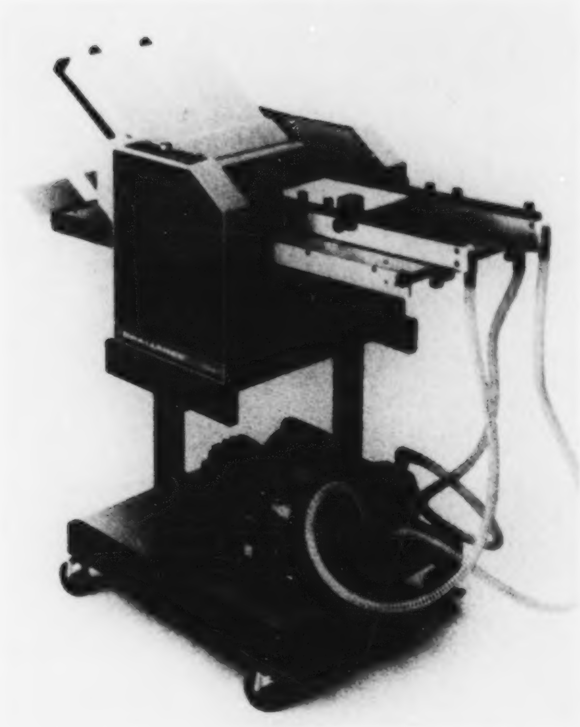
E. Letter fold



F. Map fold



INFORMATION SHEET



Folder with Portable Stand

(Courtesy of The Challenge Machinery Company)

IV. Processes associated with finishing activities

A. Embossing—Pressing sheet between two dies, one raised and one lowered, to form a raised (embossed) image

B. Flocking—Forcing tiny fibers into a wet ink image to add an unusual texture to image area

C. Foil stamping—An embossing process by which a sheet of metallic foil is pressed against paper stock using an electrically-heated brass die to stamp a metallic image in the shape of the die

D. Laminating—Applying a protective plastic coating over the finished piece

E. Varnishing—Applying a protective varnish coating over the finished piece

BINDING AND FINISHING
UNIT VII

STUDENT SUPPLEMENT 1—THE "BINDERY" IN THE COMPUTER AGE

Throughout this unit you will be introduced to the fundamental activities of the bindery, the various methods of binding books and pamphlets, the numerous ways of folding pages for binding, and some of the basic finishing processes provided by most full-service printing operations.

While these activities are the "basics" of binding and finishing and must be mastered, it is interesting to note the tremendous advancements in the "bindery" based on automation and computer technology.

Walk into any of the nation's increasingly-popular book stores and look at all of the different papers, card stock, wrapping and packaging techniques used to "add value" to the printed word. From shrink-wrapped box sets of related books, to full-color laser prints and marbleized, pebbled, die-stamped cards, calendars and wall posters, all of the eye-catching things you see were designed in the art department and accomplished either at the end of the printing press or in the bindery.

Technological advances in computerized electronics have made available bindery equipment which can automatically count, bundle, load and unload, fill boxes, stack pallets, unstack pallets, automatically jog stacks of paper, fold, glue and address orders--all as supplemental procedures at the delivery end of the printing press.

Magazine publishers make use of "Selectronic Binding," a computer-driven process by which magazines with differing editions (based on demographic data entered in the subscription base) are assembled on the press with articles and advertisements aimed at specific readers. Once those issues have been assembled and are still on the press, the cover passes through an ink-jet assembly which "sprays" the correct address and Zip Code on a mailing label and is wrapped around the issue as it completes its press run. The magazine is then perfect bound and dropped on a conveyor chain to be deposited in a mailing bin for shipping to the correct mail drop point. This "bindery" activity involves people from the advertising department, the marketing department, editorial writers and production personnel all designing and preparing the final product for readers with specific interests. None of these benefits could occur, however, without the computer-assisted press and bindery functions.

Although one might picture the "bindery" as a quiet, dimly-lighted warehouse where workers glue, fold and stitch paper and cardboard, in reality the modern bindery is one of the most sophisticated parts of the publishing industry, benefiting from the latest in computer driven electro-mechanical devices. In fact, without these latest in bindery services, most periodicals and trade magazines would be unable to compete in today's fast-paced and tight-margin marketplace.

So, as you work through this unit, realize you are learning the fundamentals of a dynamic part of the printing business--one which offers many careers downstream from the printing press.

BINDING AND FINISHING
UNIT VII

JOB SHEET #1—PAD 20-POUND STOCK

Name ______________________________ Attempt Number __________

Evaluation Criteria	**Rating**
• Paper evenly trimmed	_____
• Padding compound evenly and neatly applied	_____

Introduction: This exercise will familiarize the student with bindery fundamentals such as jogging, trimming, and gluing.

A. Tools and materials

1. 100 sheets of scrap 20-lb. stock (to be provided by instructor)
2. 2 pieces of chipboard (provided by instructor)
3. Padding compound
4. Padding brush
5. Jogger
6. Padding press

B. Procedure

1. Trim paper and chipboard to same size.
2. Count 50 sheets of 20-lb., and insert chipboard divider, then count another 50 sheets and insert second divider.
3. Place entire stack into jogger, turn on jogger until all sheet and divider edges are even.
4. Place stack in padding press with top edge of sheets lined up with front edge of padding press.
5. Put clamp or weight on stack and lock in place.
6. Using brush, apply thin even coat of padding compound to exposed edge; brush from the middle of sheet to outside edges.
7. Allow sufficient drying time, then apply second coat, heavier than first.
8. When dry, remove from press and turn in to instructor for evaluation.
9. Clean work area; return tools and materials to proper storage.

BINDING AND FINISHING
UNIT VII

JOB SHEET #2—PAD CARBONLESS PAPER

Name ______________________________ Attempt Number _________

Evaluation Criteria	Rating
• Padding compound applied evenly and dried sufficiently	_____
• Sets properly stuck together, with each set free from adjoining sets	_____

Introduction: This exercise will familiarize the student with bindery fundamentals such as jogging, trimming, and gluing.

A. Tools and materials

1. 25 two-part sets of carbonless paper (provided by instructor)
2. Padding press
3. Jogger
4. Padding brush
5. Padding compound (for carbonless paper)

B. Procedure

1. Place paper in jogger and jog until edges are even.
2. Place stack in padding press and line top edge with front of padding press.
3. Put clamp or weight on stack and lock in place.
4. Using brush, apply several soaking coats of padding compound to exposed edge, brushing from middle out.
5. Allow sufficient drying time, feeling edge with fingers, until completely dry.
6. Take stack out of padding press and, holding opposite edge from padded end, fan apart with hand.

   (NOTE: Sets should stick together, but each set should be free from the adjoining sets.)
7. Turn in to instructor for evaluation.
8. Clean work area; return tools and materials to proper storage.

BINDING AND FINISHING
UNIT VII

JOB SHEET #3—DRILL PAPER STOCK FOR A 3-RING BINDER

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Holes properly placed and completely punched	_____

Introduction: This exercise will familiarize the student with the bindery fundamental of drilling paper stock.

A. Tools and materials

1. Paper drill
2. Twenty-five sheets of 8½ x 11 paper (provided by instructor)
3. Punched or marked guide for 3-ring binder.

B. Procedure

1. Set back stop on paper drill for depth of holes on inside edge of sheet.
2. Set guide stops on paper drill, using marked or punched guide for 3-ring binder, to set distance between holes.
3. Jog sheets to be drilled and position on paper drill for first hole.
4. Set left side guide and make first hole.
5. Reset left side guide and line up with back stop setting for second hole.
6. Drill second hole.
7. Reset left side guide and line up with back stop setting for third hole.
8. Drill third hole.
9. Turn in sheets to instructor for evaluation.
10. Clean work area; return tools and materials to proper storage.

BINDING AND FINISHING
UNIT VII

JOB SHEET #4—FOLD PAPER USING FOLDING MACHINE

Name ______________________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Student followed directions	_____
• Folds neatly and accurately made	_____

Introduction: This exercise will familiarize the student with the bindery fundamental of folding machine operation.

A. Tools and materials

1. Shop folding machine
2. 20 sheets of 8½ x 11 paper (provided by instructor)

B. Procedure

1. After instructions by instructor on operation and adjustment of folder, set banks according to machine instructions for a simple 4-page fold.
2. Load five sheets of paper into the folder bank.
3. With the instructor's permission, turn on power to folder, and run the five sheets.
4. Turn off folder.
5. Submit five folded sheets to instructor for evaluation.
6. Repeat steps **1** through **5** for 6-page fold, 6-page accordion fold, and 8-page accordion fold (depending upon the capabilities of folding machine).
7. Clean work area; return tools and materials to proper storage.

BINDING AND FINISHING
UNIT VII

JOB SHEET #5—HAND FOLD, COLLATE AND STAPLE A BOOKLET

Name ______________________________ Attempt Number __________

Evaluation Criteria	**Rating**
• Forms accurately collated in proper numerical order	_____
• Staples inserted according to instructions	_____

Introduction: This exercise will familiarize the student with bindery fundamentals of folding, collating and stapling.

A. Tools and materials

1. Multi-page printing job to be assembled and stapled (side stitched or saddle stitched) as a booklet
2. Stapler, manually or electrically operated
3. Jogging machine

B. Procedure

1. Being mindful of page numbers and order, hand fold each form to be used in booklet.
2. Assemble (collate) forms in numerical page order and jog until even.
3. Set staple machine for side stitch or saddle stitch (depending upon preference of the instructor and capabilities of the machine).
4. Individually place booklets into stapler and insert staples according to instructor's directions.
5. Stack finished booklets neatly and turn in to instructor for evaluation.
6. Clean work area; return tools and materials to proper storage.

BINDING AND FINISHING
UNIT VII

JOB SHEET #6—SCORE A JOB

Name ______________________ Attempt Number _________

Evaluation Criteria	**Rating**
• Scoring head set according to job specifications	_____
• Stock neatly scored as specified	_____

Introduction: This exercise will familiarize the student with the bindery fundamental of scoring stock according to specifications.

A. Tools and materials

1. 20 sheets of medium to heavy stock (provided by instructor)
2. Offset press equipped with scoring head, or scoring machine

B. Procedure

1. In the case of press-mounted scoring head, set according to instructor's directions for your particular press run. In the case of a separate scoring machine, adjust to paper size and scoring position required.
2. With instructor's permission, make press run, or pass the job through the scoring machine.
3. Turn off power to press or scoring machine.
4. Turn in sheets to instructor for evaluation.
5. Clean work area; return tools and materials to proper storage.